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ABSTRACT

The materials collected here were generated at a workshop in which 16 participants from Afghanistan, India, Japan, Malaysia, Pakistan, the Philippines, and Nepal met to examine the subject of developing low cost educational materials. The objectives of this workshop were (1) to exchange experiences in the development of such materials through displays and demonstrations; (2) to consider the use of locally available resources and other appropriate or adapted methods and techniques; and (3) to develop samples of low cost, simple materials together with their instruction sheets, for use in training institutions and workshops, and as guides for supervisors and teachers. This report includes a discussion of the present status of the development of low cost educational materials in each of the participating countries as well as a synthesis of the experiences of these countries as a whole. Broad, conceptual guidelines based on these experiences are provided for use in formulating strategies in the individual member states. Plans for follow-up are suggested for each country, and recommendations are addressed to both participating member states and APEID/Unesco. Instruction sheets for some of the materials presented at the workshop, a copy of the workshop agenda, and a list of the participants are included. (Author/LLS)

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ASIAN PROGRAMME OF EDUCATIONAL INNOVATION FOR DEVELOPMENT APEID

Making and using low-cost educational materials

Report of a Sub-Regional Workshop in Educational Technology with Special Reference to Development of Low-Cost Educational Materials

Kathmandu, Nepal, 7–21 November 1978

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE NATIONAL INSTITUTE OF EDUCATION

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PART I

REPORT OF THE WORKSHOP: GUIDELINES AND RECOMMENDATIONS

Chapter One

INTRODUCTION

A Sub-Regional Workshop in Educational Technology with Special Reference to Development of Low-Cost Educational Materials was held at Kathmandu, Nepal, from 7 to 21 November 1978. The workshop was jointly organized by the National Education Committee, Centre for Educational Research, Innovation and Development (CERID), Nepal and the Asian Centre of Educational Innovation for Development (ACEID), Unesco Regional Office for Education in Asia and Oceania. Prior activities which contributed toward this workshop were a regional workshop on the same topic, held in Malaysia in December 1977, in which 13 Member States participated; and national workshops organized in Afghanistan, India, Japan, Malaysia, Nepal and the Philippines between August and October 1978.

Objectives

The objectives of the Sub-Regional Workshop were:

1. To exchange experience in the development of educational materials through displays and demonstrations, with special emphasis on prints, games, toys and other low-cost, simple educational materials;
2. To consider the use of locally available resources and other appropriate or adapted methods and techniques being used for designing and developing educational materials; and
3. To develop samples of low-cost, simple materials together with their instruction sheets, for use in training institutions and workshops, and as guides for supervisors and teachers.

Participation

There were 16 participants from seven countries. Two each came from Afghanistan, India, Japan, Malaysia, Pakistan and the Philippines, and four from Nepal. Two observers from Nepal also attended the workshop.

ACEID was represented by the Specialist in Curriculum Development and the Assistant Programme Specialist in Educational Technology. A list of the participants and observers is given in Annex II.

Inauguration

In his inaugural address, the Assistant Minister of Education of Nepal, Mr. Hira Lal Vishwakarma, stressed the need for sharing experiences and know-how,

especially with regard to the development of low-cost educational materials. He mentioned that the extension and improvement of education, so essential for building a sound infrastructure to facilitate the development of a country, depended heavily on an extensive use of educational materials. He illustrated the observation by giving instances of the use of the appropriate skills, interest and local resources for the development of low-cost educational materials. Finally, he stressed that a workshop of this kind, bringing together educational persons of many countries, would contribute to the cause of peace and understanding among nations.

Before the inauguration of the workshop, Dr. Prem Kumar Kasaju, Chief of the Centre for Educational Research, Innovation and Development and director of the workshop organizing committee, welcomed the participants on behalf of the host institution and stressed the importance of low-cost educational materials for the universalization of education and rural development.

Dr. Thamrong Buasri welcomed the participants on behalf of ACEID/Unesco and expressed his belief that the workshop would help strengthen national capabilities for the development and utilization of low-cost educational materials. He thanked the Government of Nepal, the Ministry of Education and particularly the Centre for Educational Research, Innovation and Development for providing full support in the organization of the workshop. He also introduced the salient features of APEID, with emphasis on the importance of sharing of experiences among the participating countries.

Dr. S.R. Sharma, Secretary of the National Education Committee, referred to the workshop as one of the many laudable steps being undertaken in promoting education in all parts of the world. He stressed the fact that education can be imparted quickly and in a meaningful manner with the help of low-cost educational materials which resourceful teachers can make or procure for themselves.

Mr. J.M. Adhikari, Vice-Chancellor of Tribhuvan University, stated in his speech that education can help the development of a nation only when it truly reflects the needs and aspirations of the country and takes into account the realities of the situation. In this context, he stressed the importance of educational materials, particularly low-cost educational materials, for enhancing the quality of education.

Election of officers of the workshop

In the first plenary session on, 7 November 1978, the participants elected Mr. Ram Krishna Upadhyay (Nepal) as Chairman, Miss Salvacion P. Navarro (Philippines) as Alternate Chairman, Dr. R. Muralidharan (India) and Mr. Adam bin Taib (Malaysia) as Vice-Chairmen; and Mr. Dilip Bakshi (India), Mr. K. Loganathan (Malaysia) and Mr. Bimal Lal Shrestha (Nepal) as Rapporteurs.

Organization and procedure

The Workshop was conducted in three phases. During the first phase, country reports were discussed. The experiences of the national workshops, organized by the participating countries prior to the sub-regional workshop, were also shared. The participants demonstrated the materials which they had brought

with them. During this period, study visits to several schools were arranged to provide the participants with an opportunity to observe educational situations, especially in the rural areas of Nepal.

During the second phase, the participants, working in three groups, synthesized their experiences and developed guidelines for further strengthening the national programmes, projects and activities.

In the final phase, the participants developed examples of low-cost educational materials, relevant to the existing educational situation and needs in Nepal. For this purpose, they analysed the curriculum and textbooks that are being used in Nepal and identified locally available materials and resources which could be utilized in the production of low-cost educational materials. Instruction sheets were prepared for each material developed.

The report

A draft report was prepared as a result of the co-operative efforts of the participants. This was presented and adopted with some modifications at the concluding session of the sub-regional workshop on 21 November 1978. Selected instruction sheets, prepared during the workshop, are included in Annex IV.

Chapter Two

THE PRESENT STATUS OF THE DEVELOPMENT OF LOW-COST EDUCATIONAL MATERIALS

The current aspirations for improved educational opportunities in Asian countries which were represented in the workshop justify greater efforts in the development of low-cost educational materials. The abundance of indigenous raw materials and other resources which can be utilized into useful educational materials, and the rich cultural heritages and traditions from which to create relevant curricular programmes and activities for children, must also be taken into account. The trend to more personal and human teaching, especially in developing areas, demands the optimum use of locally-produced educational materials. Teachers, administrators, parents and other concerned people in the community are increasingly aware of and enthusiastic about locally produced educational materials. All of these factors encourage the development of low-cost educational materials to balance those unattainable, sophisticated and expensive ones.

The existing situations in the participating countries and the highlights of their national workshops held prior to the Sub-Regional Workshop are presented in this chapter.

AFGHANISTAN

National policy and the status of low-cost educational materials

The importance of low-cost educational materials, especially those which are locally available or can be cheaply and easily produced, has long been recognized in Afghanistan. Though efforts have been made to provide the schools with educational materials regardless of their origin or level of sophistication, the trend has shifted more towards locally available low-cost educational materials.

The National Science Centre and the Audio-Visual Aids Centre are the two main offices in the Ministry of Education which are specifically involved in the development programme for low-cost educational materials. The National Science Centre (NSC) is responsible for providing science and mathematics kits for high schools, i.e. grades IX to XII; while the Audio-Visual Aids Centre (AVA) is responsible for kits for the primary schools, i.e. grades I to VIII. The National Science Centre has produced kits for high schools in biology, chemistry, physics and mathematics. The Audio-Visual Aids Centre has prepared science and mathematics kits for primary schools.

In addition to the kits, the two centres prepare prototype materials such as models, maps, charts, educational films, filmstrips and slide sets. Such materials are designed for the distribution and introduction of newer ideas to the provincial or

local levels, and are introduced to the provincial supervisors through seminars and workshops. The provincial supervisors, in turn, train the school teachers in the production and utilization of the materials.

Problems and issues related to low-cost educational materials

A. **Personnel**

Lack of skilled and trained teachers and supervisors. In some cases the teachers do not use the available educational materials.

B. **Materials**

Insufficient quantity of chemicals and lack of the tools needed to prepare educational materials. The schools in the provinces and distant localities are most affected by this problem.

C. **Distribution**

Poor transportation facilities in the Ministry of Education for the delivery of educational materials, supplies and equipment.

D. **Use of materials**

In distant localities, teachers have very limited knowledge about the importance and use of low-cost educational materials. This accounts for the unused materials found in store-rooms or cupboards in many schools.

The national workshop

The national workshop was held from 21 to 26 October 1978. The 30 participants, composed of one expert, three specialists, two science supervisors and 24 teachers, represented the Ministry of Education, teacher training colleges, the Adult and Literacy Programme Centre, the Radio Television Centre, kindergartens, schools in the provinces, the Audio-Visual Aids Centre and the National Science Centre.

Ideas and experiences were exchanged in a cordial and informal manner during the workshop. Various low-cost educational materials were developed and evaluated. Instruction sheets were incorporated in the report on the national workshop.

Annotated list of low-cost educational materials developed

1. ***Right-angled triangle to construct various geometrical shapes***—a simple square paper which can be folded into as many geometrical shapes as possible.

2. ***Prism***—a very low-cost prism made of three glass strips held together by a triangular piece of metal, or plastic sheets and scotch tape.

3. ***Discarded bulb lens***—an inexpensive lens made from a discarded electric light bulb which can be used as a microscope or an optical lens.

4. ***Spring balance***—a very simple weighing device made of a flat piece of wood, elastic thread and a metal pointer.

5. ***Gears***—different sizes of wooden gears constructed to show the relative revolutions and direction of movement of the gears.

6. ***Spirit level***—an ampoule filled with distilled water attached in the centre of a wooden block which can be used to test the uniform level of horizontal surfaces.

7. ***Map printing can***—a very simple map printing device made of an empty long cylindrical can and a map which is outlined with thick cotton thread. The cotton thread outline is soaked with ink to print the map as the can is rolled on paper.

8. ***Trundle wheel***—a wooden circular disk with a circumference of one metre and a wooden handle. A complete turn of the wheel measures a metre and is accompanied by the sound of a small bell or a click.

9. ***Simple compass***—made of bar magnets, a thin strip of metal and a piece of polystyrene, the compass is constructed so that it shows the north and south directions.

10. ***Handmade periscope***—made of a piece of cardboard measuring 22 cm. x 60 cm. and two plane mirrors, it can be used to review objects either below or above eye level.

11. ***Newton's coloured rotating disc***—a spinning top is covered with seven equal pieces of coloured paper in red, orange, yellow, green,blue, dark blue and violet. When the top is rotated at full speed, the colours merge to form white.

12. *Letter pockets*
13. *Word Pockets*
14. *Number pockets*
15. *Number line*
16. *Number wheel*
17. *Geoboard*
18. *Simple telephone*
19. *Geometrical models*
20. *Flash cards*
21. *Cardboard clock*
22. *Pocket calendar*
23. *Clinometer*
24. *Multiplication by fingers*
25. *Multiplication with number nine*
26. *Letters for teaching and writing directions*
27. *Blackboard drawing aids*
28. *Area measuring device*
29. *Ball and ring*
30. *Proving geometric axioms*
31. *Rotating sack*
32. *Wooden slide-rule*
33. *Figures on the board*
34. *Fruit models*
35. *Light travels in a straight line*
36. *Dark chamber (Pin-hole camera)*
37. *Shadow and semi-shadow*
38. *Solar and lunar eclipses*
39. *Plane mirrors*
40. *Displacement of a plane mirror*
41. *Rotating a plane mirror*
42. *Light reflection*
43. *Images produced in two plane mirrors*
44. *Concave mirror*
45. *Refraction of light*
46. *Index of refraction*
47. *Light analysis*
48. *Concave/convex lens*

INDIA

National policy and the status of low-cost educational materials

Half of India's large population are children. Schools and teachers are numbered in millions. Many schools lack all but the most basic necessities, having budgets so small that the purchase of educational equipment and supplies can hardly be considered. It is, therefore, national policy to encourage teachers to develop low-cost educational materials based on local resources.

Low-cost educational materials are being developed at several levels. At the national level, the National Council of Educational Research and Training (NCERT) is responsible for the programme. It is involved in the research and prototype development of educational materials at all levels of education, from pre-primary to the higher secondary level, and ranging from simple toys and games to very complex materials. It also mass produces some materials such as textbooks, teacher guides and science kits. Another major activity of the NCERT is the training of teacher educators and other personnel from the State Institute of Education. Almost every department organizes seminars

and workshops to acquaint the participants with the need for and methods of producing low-cost educational materials.

The National Science Exhibition organized annually by the NCERT has proved to be a good way of motivating children to use and produce low-cost educational materials. Every year children come up with novel ideas and materials to improve science education. This exhibition is organized at the district level, State level and finally at the national level.

At the State level, the same types of activities are carried out by the State Institutes of Education (SIE) or State Councils of Educational Research and Training (SCERT), the State institutes of science education, State audio-visual units and the educational technology cells. Through workshops and seminars of teachers, these institutions are trying to promote the production of low-cost educational materials for the improvement of teaching/learning strategies. Such workshops are held both at the State and district levels.

In addition, commercial agencies have also contributed to the development of low-cost educational materials. Varieties of low-cost materials such as maps, charts, models, toys, games, picture books and science equipment are now on the market. Unfortunately, the school budget is often so minimal that many schools are unable to purchase these materials.

Problems and issues related to low-cost educational materials

As pointed out earlier, one of the major problems is the shoe-string budgets of the schools. This problem relates not only to schools' ability to purchase low-cost educational materials, but also to their maintenance and replacement.

Another problem is that of inadequate teacher training. Games, toys, and various natural materials are available in abundance, but unfortunately they are not fully utilized in the schools. The resourcefulness and creativity of teachers in improvising materials from available resources need to be encouraged. The teachers must be convinced that children learn more by doing, and that educational materials are essential in learning. Teacher training institutions also need to be updated, both in terms of teaching methods and facilities. It is necessary to make them more child-centred rather than subject-oriented. Therefore, the educational materials production programme should be based on the principles of child development.

The national workshop

Several regional workshops had already been held on low-cost, simple science materials and so it was decided that the national workshop should focus on educational toys and games. It was convened in October 1978, by the Centre for Educational Technology (CET) of NCERT, as part of its Children's Media Laboratory Project.

The participants were drawn from teacher training institutions, child welfare workers' training institutes, departments of child development in the universities, science centres and other related national level organizations. There were altogether 41 participants: 31 from outside NCERT and ten staff members of NCERT. There were about 1,500 items of toys and games brought and displayed by the participants.

Development of low-cost educational materials

The workshop programme included an exhibition, display and demonstration by each participant. Discussions were held on: identification of unused and under-utilized materials, innovative techniques and methods for production of low-cost, simple play materials and teachers' guidelines for designing, developing and utilizing of such materials. As a result of the discussions, a list of inexpensive raw materials available in each region and a set of recommendations for further development of low-cost educational materials were drawn up.

The following recommendations were made at the national workshop:

1. An inventory of low-cost, simple educational materials be prepared in each region, to include the title of the material; a brief description, its potential uses; the materials used and possible substitutes; and the suggested age range; grade level, and subject area.
2. A central display centre be set up at the NCERT wherein educational toys and games will be displayed and related activities be conducted.
3. A mobile library of toys, games and other materials, along with a teachers' resource centre, be established in every State, either by SIE, SCERT or other educational organizations or individuals in the area.
4. A kit of technically simple educational materials be developed for wide-spread distribution, to cover the following aspects:
    a) Manipulative toys
    b) Problem solving toys,
    c) Toys for development of concepts in science, and
    d) Language enhancing materials.
5. Short films on children's play, play materials, children's growth and development and the like be produced by CET and released by the Films Division, to be screened along with feature films as a contribution to the International Year of the Child.
6. To disseminate information on how best to utilize the materials and techniques, toy centres at the State levels be set up to design and develop prototypes and distribute raw materials to pre-primary and primary schools; and to produce low-cost toys from waste materials for large scale distribution, with the assistance of the Small Scale Industries Scheme or the Central Social Welfare Board.
7. The situation of traditional toy makers be improved with the assistance of the All India Handicrafts Board.

Annotated list of low-cost educational materials developed

1. Musical instruments made of bottle tops, coconut shells, old cans, dried seeds, and so on.
2. Various dolls to encourage imaginative play made of clay, rags, grass, wax, and so on.
3. Rod, glove and finger puppets made out of match boxes, paper, cardboard, old socks, paper bags, rope, and papier mâché.

4. Masks, ranging from face masks to full body length masks, made out of the same materials as listed in Item 3.
5. Counting beads made out of paper, wax, wood, and seeds.
6. Animal models made of paper, wood, grass and clay.
7. Language aids—alphabet cards, flash cards, flannel graphs and pictures, rolling boards and pictures, self-learning reading materials, rotating story discs, and so on.
8. Arithmetic aids—number cards made out of beads, strings, dried pods, date palms, sandpaper, digits, multiplication cards of conches, sliding frame boards for addition and subtraction.
9. Cognitive aids—sound boxes, touch plates, touch boards, colour cards, bamboo cylinders and coconut shells for size discrimination.
10. Science aids—telescopes and periscopes made of cardboard, glass and magnifying glass.
11. Manipulative toys—acrobats made of bamboo, coconut shells, tortoise, spinning coloured paper, bamboo, water pistol, and so on.
12. Games—a large number of low or no-cost traditional games of educational value were demonstrated. These will be printed as a separate publication of CET.

JAPAN

National policy and the status of low-cost educational materials

Some policy decisions made in 1968 by the Ministry of Education, Science and Culture have contributed substantially to encourage teachers, teacher-trainers in colleges of education, and other educational personnel to participate more actively in educational technology. Many projects were undertaken and there are now a large number of publications on such development. One publication entitled ***Educational Materials: Its Scope and Application,*** is very popular and has been well-received by the teachers. In 1977, the Japan Society of Science Education was established to undertake more research work along similar lines.

During the last five years, about 20 or more centres for educational technology have been established as integral parts of institutes of education in the national universities. The main aim of these centres is to conduct research activities in the area of educational technology and disseminate new ideas among teachers.

About ten years ago a list of standard educational and audio-visual apparatus was prepared. With more funds made available in 1976, a number of new materials were added to the list.

National workshops on audio-visual techniques are held every year, with selected teachers from all districts participating. Such workshops are funded by the Ministry of Education, Science and Culture. After training, the teachers return to their districts and hold similar training sessions for other teachers.

Development of low-cost educational materials

Problems and issues in the development of low-cost educational materials

In Japan many expensive teaching apparatuses and methods are available, such as computer-assisted instruction and complex language laboratories, which are popular with many educators. These are developed by commercial firms which also produce low-cost educational materials, but only on a very limited scale. Instructors in pre-service education fail to recognize the problems in the classrooms and base their lectures mainly on theories. What is needed is an awareness of the importance of low-cost educational materials made out of locally available resources, in order to improve teaching/learning situations among teachers. Research on design and development of suitable low-cost educational materials is equally important.

The national study workshop

The national study workshop was held from 11 to 15 October 1978, at the Centre for Research and Development of Educational Technology (CRADLE), Tokyo Institute of Technology. Seven persons who are involved in educational technology programmes in Japan participated in the workshop.

The participants analysed papers which had been presented to the Technical Group of Educational Technology (TGET) in the last three years, including the papers presented in the national workshops held in May and August 1978.

Discussions were held on the following points:

1. The availability of low-cost educational materials was seen to be dependant on the resources in the country. For example, bamboo is not a low-cost material in most parts of Japan any more.
2. Low-cost, simple materials including games and toys, the hardware and software needed, and instructions for use were considered. The importance of a harmonized, balanced use of these three categories was emphasized.
3. The potential in unused and under-utilized materials were discussed, such as matchsticks, magnet buttons, rubber bands and rubber tubes.
4. It was felt that the curriculum development programme should include strategies and techniques which make maximum use of low-cost, simple educational materials.
5. Some low-cost educational materials were found to be most useful in 'drill and practice' exercises for enrichment purposes and for strengthening concepts.
6. The distribution system of materials is important and needs serious attention.
7. The creativity and resourcefulness of teachers in utilizing the various materials in the environment results in the production of relevant programmes. Teacher education programmes, therefore, should seriously consider measures for developing creativity, resourcefulness and technological know-how among future teachers.
8. The development of low-cost educational materials should be geared closely to the courses of study, the age level of the children and their experiences. Good teaching plans, audio-visual strategies and techniques need equal attention.

9. It was proposed to undertake a survey of companies in Japan which are making low-cost educational materials and toys. One publishing company is now developing a variety of low-cost educational materials which are of much interest to students. These materials are inexpensive because they are mass produced.

Annotated list of low-cost educational materials developed

1. Bifocal transparencies for overhead projector (OHP);
2. Cut-out transparencies for OHP;
3. Simple testing machine;
4. Yalkeys System III (answer cards);
5. Paper trumpets;
6. New windmill (rotating patterns);
7. Introduction to unique transparencies for OHP, using either the polarizing poly-colour plate system, or the transparencies for OHP with movement effects—an application of the moire-effect;
8. Peekaboo envelope—for drill and practice exercises. A problem card is inserted into the special envelope in which two square holes are cut. The student's answer to a question can be compared with the correct one.
9. The area of a parallelogram—a stack of paper or match sticks are used;
10. Straw whistle;
11. Can planetarium;
12. Mapping with holey board;
13. Simple electrolysis apparatus;
14. Chinese top with string and two rods;
15. Moving cup with clay ball and rubber band;
16. Printing with Indian-ink (Suminagashi);
17. Playing quoits with cans and wires;
18. Circuit game with magnet and a piece of iron sheet;
19. Expiration changes water colour in a container with brom thymol blue solution;
20. Coin circus show—with a wire coat hanger and coin;
21. Observation and record on magnetic field;

MALAYSIA

National policy and the status of low-cost educational materials

In Malaysia there is an increasing recognition of the relevance of educational technology, especially the development of low-cost educational materials. In the University of Sains in Penang, diploma and master-level courses in educational technology are offered. In the teacher training colleges and the education faculties in the universities, there are training courses in the use of audio-visual equipment and materials. The educational media service of the Ministry of Education develops and produces educational materials, and also gives training to the key personnel in educational technology. In a number of States there are teacher associations to promote the development of low-cost educational materials which hold seminars

and workshop sessions periodically. In connection with research in renewing the school curriculum, active research in educational technology is being conducted by the curriculum development centre of the Ministry of Education.

Problems and issues related to low-cost educational materials

While there is an increasing awareness of the importance of low-cost educational materials among teachers, the heavy teaching load, extra-curricular activities and demands made on them by the administration limit severely the time available for developing low-cost educational materials. Although there is a well-developed local industry for the production of the science apparatus needed by schools, there are not enough commercial firms engaged in the production of low-cost education materials.

The standard of research in educational technology is improving thanks to greater participation by more qualified people. However, systematic research of all aspects of experimental design is just beginning. There is inadequate evaluation of the materials produced in relation to their effectiveness in achieving the instructional objectives.

Teacher participation, though increasing, is not as extensive as it should be. More workshops at State levels are being planned to draw more teachers' attention to the designing, producing and utilizing of low-cost educational materials.

The national workshop

The national workshop on educational technology was held in the Curriculum Development Centre, Kuala Lumpur from 2 to 7 October 1978. This served to bring together teachers and agencies in the area of educational technology, to discuss and exchange views and to co-ordinate activities. It was jointly sponsored by the Curriculum Development Centre and the Educational Media Service. There were about 45 participants, comprised of teachers, university and college lecturers, State audio-visual aid officers and ministry officials.

In his inaugural address, the Director-General of Education emphasized the relevance of educational technology in making a teacher a professional. He also mentioned that the Ministry of Education would study carefully the recommendations of the participants to support the development of low-cost educational materials. There were talks, group discussions, a panel discussion and workshop sessions. A number of low-cost educational materials were developed by the participants.

Annotated list of low-cost educational materials developed

1. Flexible sentence tables for teaching the tenses, mid-position adverbs, and co-occurrence;
2. Word wheels for teaching the correct use of some suffixes and prefixes;
3. Language games—guggenheim/word classes
4. A set of super-imposed transparencies for teaching the mathematical formula: $(a + b)^2 = a^2 + b^2 + 2ab$;
5. An apparatus for teaching the binary system of numbers;

6. An apparatus for recording the weather;
7. A map of India using expanded polystyrene sheets;
8. A game of monopoly using simple materials and printed dollar notes to teach some business concepts;
9. A simple response analyser for evaluating the level of understanding of the children in the class;
10. An apparatus for teaching energy conversion;
11. An effective micro-wind detector;
12. A box shadow play;
13. Mini-counting frames for children;
14. Demonstration counting frame to teach arithmetic;
15. A simple slide projector-type apparatus to show lens action;
16. A time-scale for teaching large time units;
17. A model of traffic signal lights;
18. A model for showing the breathing system of mammals;
19. An apparatus to teach geographical concepts in the 3-D way;
20. A multipurpose OHP tray;
21. Innovative uses for a rod set of different lengths and colours;
22. A simple thermometer to teach the concept of temperature

NEPAL

National policy and the status of low-cost educational materials

It was not until 1950 that education in Nepal was expanded to reach the majority of the people in the Kingdom. The teaching/learning process was predominately based on the lecture method. Student activities and classroom demonstrations were almost non-existent. In order to improve the situation, some measures were taken, i.e. Science Teaching Enrichment Programme (STEP) and Programme for Revision and Improvement in Mathematics Education (PRIME). The schools where these programmes were launched were provided with equipment and materials supplied by UNICEF. The teachers were given training to adopt new methods of teaching. One of the significant features of the 1971 Plan for National Education System was the establishment of the Curriculum Development Centre (CDC)—now known as the Curriculum, Textbook and Supervision Development Centre (CTSDC)—and of the Science Equipment Centre (SEC) as a separate unit under the Janak Education Material Centre (JEMC).

The CTSDC, which was responsible for designing, developing and revising the curricula in all subject areas, has been developing curricula geared to the resources available in the immediate environment. The Science Equipment Centre has been developing and producing curriculum-based science and vocational education equipment. The Institute of Education (IOE) has been conducting in-service and pre-service teacher training programmes to fulfil the national need for trained teachers. Educational materials are made available to schools and activity-oriented teaching is being encouraged. The results remain somewhat unsatisfactory for the following reasons:

1. Most of the teachers are still untrained;
2. The teachers are not familiar with the equipment and materials provided to them;
3. Teachers cannot repair and maintain the equipment due to a lack of knowledge and of storage facilities; and
4. A large amount of money is involved in providing imported equipment and materials.

The need for simple, low-cost and indigenously prepared equipment and materials is felt at the national level. Accordingly, the SEC has started developing two kinds of prototype equipment: one that can be produced by the Centre and the other that can be prepared by teachers themselves by using local materials. The CTSDC has conducted several short-term teacher training programmes with special emphasis on the use of simple materials. It has carried out innovative and successful projects in different subjects, emphasizing the development and use of simple educational materials.

The CTSDC has also conducted national science education workshops which have been effective in imparting knowledge and skills to key persons in this field. The CTSDC and the Centre for Educational Research, Innovation and Development (CERID) jointly conducted three regional workshops (each of six days' duration) in which the teachers were given training on how to prepare simple educational materials for science teaching, using local resources. The CERID organized a national seminar for head-masters, where they were shown how simple educational materials could be developed and used effectively in teaching.

The CERID project on education for rural transformation at Lahachok has pioneered in developing the concept of linking education to local development, with a great deal of emphasis on locally available, low-cost, indigenous materials for use in the educational system. This concept has now become a part of the guiding principles in the setting-up of model schools in each of the 75 districts in Nepal, and it is hoped that it will go a long way in creating an educational climate favourable to learning by direct experience.

Finally, the development and use of low-cost educational materials is a major activity during the short-term training programmes organized by the District Education Officers in their respective districts. The Institute of Education is also contributing significantly to the development and use of simple low-cost educational materials by way of its teacher training programmes.

Problems and issues related to low-cost educational materials

The following problems and issues have been identified:

1. Inadequate emphasis on the development and use of low-cost educational materials;
2. Inadequate budgetary provision for the development of low-cost educational materials in teacher training;
3. Inadequate emphasis on practical aspects of the development of low-cost educational materials in teacher training;

4. Inadequate classroom and storage facilities in the schools;
5. Lack of trained personnel in the area of educational technology.

The national workshop

The Centre for Educational Research, Innovation and Development (CERID) conducted a national workshop in educational technology with special reference to low cost educational materials from 25 September to 1 October 1978. Twenty-six persons from six different institutions, namely, IOE, CTSDC, SEC, JEMC, CERID, District Education Offices (DEO) and some schools participated in the workshop. The participants included teachers, headmasters, supervisors, specialists, and administrators. The following was the outcome of the workshop:

1. More than 60 low-cost educational materials were developed;
2. A list of basic tools for the preparation of educational materials from local resources was made;
3. A list of basic raw materials for the preparation of educational materials was also prepared;
4. A teacher's handbook with certain guidelines for developing and using educational materials was draughted;
5. A list of games and toys used by the children in the country was drawn up; and
6. Strategies in utilizing local resources in the development of low-cost, simple educational materials were identified.

Annotated list of low-cost educational materials developed

1. A balanced-diet chart—real things being much more effective than symbols, in this chart real grains or food items are used, instead of diagrams as in traditional charts.
2. Periscope—a periscope made from a bamboo tube.
3. Electric circuit—an electric circuit with a bulb holder, a battery holder and a switch.
4. Cubic blocks—blocks for teaching mathematics.
5. A lungs chart—a chart of full-sized human lungs.
6. Model of lungs—this model shows how the lungs work, using two balloons and a bamboo tube.
7. Models of angles and triangles.
8. Weights—different measures of weights are made from calibrated lumps of clay.
9. Clock face—a model of a clock made of heavy paper, showing the minute and hour hands and the numbers on the face.
10. Flannel board—a simple flannel board made of local materials for different subject areas and teaching activities.
11. Abacus—an abacus prepared from scrap materials, and locally-available, natural materials such as seeds, bamboo, and tiny nuts.

12. Paper stand—a simple stand made of heavy paper to be used as a holder for word patterns.
13. Pull chart—a chart made with pockets and strips of paper containing phrases, words, or sentences which can be rearranged, pulled and replaced as desired.
14. Word-box—a toy-like box to be used in vocabulary development.
15. Torchlight—a bamboo torchlight which can be used satisfactorily in the dark or when electricity fails during the day.
16. Magnifying glass—a magnifying glass made out of a fused electric bulb, which can be used successfully in the lower grades.
17. Spring balance—a bow-type spring balance with a calibrated handle, which can be used satisfactorily in weighing small articles or goods.
18. Model of a house—a miniature of a typical Nepalese house, made from scrap materials.

The following educational materials are being used in pre-vocational and social science classes:

19. Model of a Nepalese bag—a model made of scraps or throw-away materials to be used in handicraft classes.
20. Model of a shoe—a model made of scrap materials which can be used in teaching the parts of a shoe and how shoes are made.
21. Model of a galaxy
22. Model for algebraic formulae
23. Apparatus to show Archimedes' principle
24. Measuring cylinder—a measuring cylinder made from an ordinary distilled-water bottle.
25. Funnel—a funnel made from an ordinary bottle.
26. Manometer—a manometer made of plastic tubing.
27. Model of mountains and terraces—a multi-purpose model of mountains and terraces made of cardboard.
28. Chronological chart for social teaching.
29. Cards on miscellaneous subjects.
30. Maps
31. Apparatus for gas preparation—this apparatus can be used successfully instead of the wolf-bottle.
32. Newton's ring—a toy-like Newton's ring.
33. Bulb-holder—a simple bulb-holder which can be made easily from available scrap materials.
34. Musical instrument—an all-bamboo musical instrument.
35. A stencil printer—a low-cost duplicating machine which can be made

easily with available local materials and can be used as effectively as a standard commercial one.

36. Model of the solar system
37. Spheres
38. Aquarium
39. Chart of Kepler's Law
40. Model of eclipse of the moon or sun
41. Geo-board

PAKISTAN

National policy and the status of low-cost educational materials

The national policy of the government of Pakistan has been directed towards the preservation of the social and cultural heritage based on Islamic ideology. General education at the primary and lower-secondary levels is also geared to fulfil the socio-economic needs of the country.

A curriculum activity kit has been developed to make the teaching/learning experiences more meaningful and purposeful to the child. The activities call for observation and experimentation. The kit is comprised of 100 items or activities on such subjects as science, mathematics, social studies and the languages. An atlas of Pakistan, a teacher's tool kit and a teacher's manual are among the many things included in the kit. About 30,000 teaching kits have been distributed among the primary schools in Pakistan. The target is 100,000 kits to be supplied to schools by 1980.

The National Educational Equipment Centre is developing prototype low-cost educational materials for wide-scale distribution. The Ministry of Education has also launched a massive programme for supplying teacher training institutions with modern teaching devices such as equipment for agro-technical subjects, home economics, science laboratories and library books on various subjects.

In the National Institute of Teacher Education, Islamabad, latest trends in the field of instructional technology, such as the use of video tapes for micro-teaching have been introduced. Twenty-one sets of portable video equipment have been distributed to teacher educators' institutions all over the country. These institutions have conducted five audio-visual technology workshops since 1974. The main objective of these workshops was to expose master trainers to the latest trends and development in educational technology as well as the production of audio-visual materials. The prospective teacher is also trained in the use of sophisticated hardware as well as in the production and utilization of low-cost educational materials.

At the Museum of Science and Technology, the principles of science and their applications are explained through easily understood working models and displays using light, sound, movement and colour.

Development of low-cost educational materials

Problems and issues related to low-cost educational materials

1. Several components of the curriculum activity kits are produced commercially. The rate of production is slow and the suppliers cannot cope with the demand target of 100,000 kits.
2. Distribution of the kits is another problem because of the inaccessibility of some schools in the remote areas.
3. Training of teachers in the effective use of the kit, its care and maintenance is another big problem.
4. Primary school teachers are restricted to the kit and its manual. There are no guides for development, production and utilization of other low-cost educational materials.

There was no national workshop in educational technology conducted in Pakistan prior to the Sub-regional Workshop, hence, no annotated list of low-cost educational materials is available.

PHILIPPINES

National policy and the status of low-cost educational materials

The value of educational materials in the improvement of the quality of instruction is widely recognized and accepted in the Philippines. The use of educational materials is part of the continuing curriculum development programme particularly in the pre-service and in-service training of teachers. Since the organization of a national audio-visual programme in 1953 and the establishment of audio-visual centres in the Department of Education and Culture and in the teacher training institutions, there has been a marked progress in the development of low-cost educational materials. These materials include chalkboards, flannel boards, bulletin boards, objects, specimens, models, graphs, charts, maps, diagrams, flat pictures, and other easily prepared materials which help in improving the teaching/learning situations. The direct involvement of teachers, parents and some commercial agencies in the production of low-cost educational materials has been a motivating factor in the extensive use of such materials in the schools, especially in elementary and secondary education.

The development of innovative projects and strategies in the school system, such as Instruction Managed by Parents, Community and Teachers (IMPACT), the In-school, Off-school Approach (ISOSA), small group and self-instruction, has also focused attention on the increasing use of low-cost educational materials. The National Board of Education and local school boards have given priority attention to the procurement and production of instructional materials for all grade levels.

Problems and issues related to low-cost educational materials

1. Inadequate budgetary allotment for the procurement of supplies, materials and facilities needed for the production of low-cost educational materials.

2. Inadequate skills of teachers and supervisors in the preparation and utilization of low-cost educational materials.
3. The reluctance to use low-cost educational materials in the classroom shown by some teachers and school administrators, who regarded them as time-consuming, unnecessary gadgets.
4. Poor management, especially in the distribution, repair and maintenance of available low-cost educational materials. In most cases schools located in distant places are deprived of available educational materials, while materials which are damaged or out of order are just stored away.

The national workshop

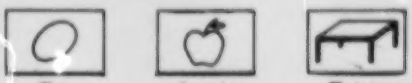
The Ministry of Education and Culture, in co-operation with ACEID conducted the workshop from 21 to 25 August 1978, at the Lemery Pilot Training Centre in Batangas. The 30 participants were composed of 13 educational media supervisors from the 13 regions, four from curriculum development centres, nine teacher education instructors, one non-formal education supervisor and three researchers from the Central Office. The participants brought to the workshop some models of educational materials as well as indigenous raw materials and work implements which they used in the development of low-cost educational materials.

The following recommendations of the participants were presented for possible consideration and action by the administration:

1. That regional workshops on the preparation of low-cost educational materials be held during each school year to replenish and update the teachers' instructional materials;
2. That the participants conduct echo workshops on the preparation of low-cost educational materials at the division and district levels;
3. That all school divisions, irrespective of class, be provided with qualified educational media supervisors to strengthen the educational media programme and to give the needed direction and assistance in the preparation of low-cost educational materials;
4. That a regional media supervisor be assigned to co-ordinate and provide maximum direction to the media programme;
5. That specific appropriations be allocated with special attention to the procurement of equipment, supplies and materials needed in the preparation of low-cost educational materials;
6. That the selected exemplar materials which have been tested and produced be mass-produced for distribution and use in schools throughout the country; and
7. That there should be a continuing programme to produce and evaluate low-cost educational materials under the co-operative leadership of all school officials.

Annotated list of low-cost educational materials developed

1. Cart of knowledge—a toy cart made from a shoe box with plastic bottle caps as wheels. Inside the cart are empty cigarette boxes filled with drill materials to encourage skills in communication, mathematics, social studies, and so on. A carabao or buffalo cut-out pulls the cart.
2. Puppets—these are made from discarded nylon stockings stuffed with scraps of cloth and dressed in costumes of other lands.
3. Word-O-Matic game—a simplified version of the crossword puzzle. The surface of the board is divided into several squares. A picture of an object (painted on square cardboard) is placed first on the square. This is followed by letters which form the name of the object.
4. Spell-o game—a brain tickler for fast learners. It consists of a board divided into squares. Twenty-six pictures of different objects whose initial letters represent the alphabet are drawn on bamboo chips. There are four sets of these drawings for each letter. Players form words by using the initial letter of the objects in the pictures.

   Example: ***EAT*** is formed by 

5. Mix matcher—a multi-purpose teaching aid which can be used in any subject area. It consists of a standing bamboo frame with containers below the frame. A poster or picture is inserted into the frame and words that match with the picture, are placed inside the containers.
6. Feathered skills—a device which can be used in any subject area. Letters of the alphabet are written on paper which has been cut into floral shapes. Each of these flowers is pasted on the tip of a feather. A player selects a feather and gives as many words as he knows that begin with the letter on the feather.
7. Popsi-kit—this makes use of discarded popsicle sticks which are cut into squares and painted with the letters of the alphabet. Three popsicle sticks are glued together to form a box-like container, in which the letters are assembled to form words.
8. Folding see-through pocket chart—the right-side half of this chart is made of buri mat folded into four pockets and the left-side half is made of plastic sheet likewise folded into pockets. Words and pictures in the pockets are matched or paired together.
9. Target master—a game which makes use of a discarded box where a bull's eye is drawn. Each concentric circle or ring around the bull's eye is painted a different colour. Numbers representing points are painted on each ring. Darts are made of feathers attached to pointed bamboo sticks or nails. The numbers hit by the players are added together to select the winner.
10. Mechanical wave generator—this is a simplified pendulum oscillator, made of a cardboard funnel. Grains of sand are placed inside the funnel which

is suspended by a string on a stick placed across two chairs. A long sheet of paper is placed on the floor under the funnel and is gradually but steadily pulled as the funnel swings and oscillates from side to side. Uniform waves of sand grains are formed on the paper.

11. Numerical totem pole--an upright bamboo pole of about 1½ metres. Lines and numbers from 0 to 10 are painted on both sides of the pole. Holes are bored along the numbers. Players take turn in answering questions. The player who answers correctly progresses up the pole by sticking his flag into the next higher hole. The player whose flag reaches the top first wins the game.

12. Magic tree—a drawing of a small branch of a tree is attached to a background. Fruit cut-outs are made. One side of the cut-out is painted 'PICK ME' and the other side is a mathematical problem or a question in any subject area. The fruit cut-outs are then hung on the branch. The child who answers the question correctly keeps the fruit as a reward.

13. Jigsaw map—an outline map is drawn on a buri mat. Jigsaw pieces which represent the different provinces are coloured and the name of each province written on each piece. The children fit the correct pieces on the outline map by comparing the shape of the cut-out province with the shape on the outline map.

Chapter Three

SYNTHESIS OF THE EXPERIENCES OF THE PARTICIPATING COUNTRIES

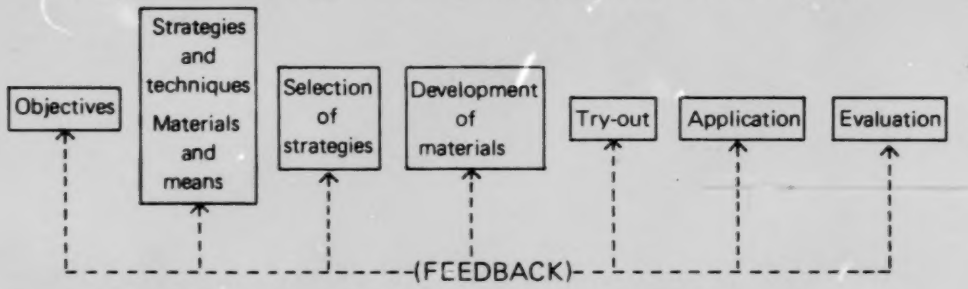
The reports from the participating countries revealed present trends and highlighted some problems in actively promoting the development of educational technology. The contents can be conveniently discussed under the following headings:

1. The child and educational technology.
2. Problems in design, development, utilization and evaluation.
3. National constraints affecting educational technology.
4. Attitudes and values of teachers, parents and the community, and their involvement in the development of low-cost educational materials.
5. The management of educational materials.
6. Mechanisms for the dissemination of low-cost educational materials.
7. The role of the educational administration and other agencies in the promotion of educational technology.

1. The child and educational technology

Educational technology is not an end in itself, but only a means to an end. If the focus of attention is on the child, the role of educational technology is then to foster and accelerate child development.

Educational technology for the school can be conceived as follows:



The aspects of child development in which educational technology can play a vital role are: cognitive development, psycho-motor development, socio-emotional development and moral development. For example, educational technology can be of specific help in fostering self-expression, concept formation and creativity. Similarly it can also help in discrimination and production of speech sounds, particularly in the case of handicapped children. Again, eye-hand co-ordination and finger dexterity are instances in which educational technology will be of considerable use. Games and toys are of great significance in fostering socio-emotional

development. Educational technologists can devise specific games that help in the development of leadership and co-operation. Role-play helps children understand the roles of various people and how they stand in relation to others. Experimentation with different classroom arrangements and settings can also help in developing social interaction. Doll-play, puppet play and dramatization are techniques that help the child to release his pent-up emotions. In sum, educational technology can be of great help in fostering child development if carefully and systematically planned and implemented.

On examining the situations that prevail in the participating countries, it was observed that educational technology is still curriculum-oriented and not child-centred in most cases. In Malaysia, some efforts at applying theories of development to educational technology are made; however, there is no conscious systematic application of psychological models for the development of materials. In Afghanistan, Nepal and Pakistan production of educational materials seems mostly curriculum-centred. In Japan, commercial agencies play a very important role in educational technology, but in many cases they lack sufficient background in child psychology; as one result, the materials produced are, by and large, curriculum-based. In India, much of the production of materials is curriculum-oriented, but there is some evidence of private manufacturers and educators getting together and devising materials for maximizing child development. The setting up of the children's media laboratory is also an indication of the growing awareness of making educational material production child-centred.

2. **Problems in design, development, utilization and evaluation**

In all the participating countries, there is at least one centre which is specifically concerned with design, development and evaluation of educational materials. In Afghanistan, there is the National Science Centre which develops science kits for the high school level, while the Audio-visual Aids Centre develops all relevant materials for the primary schools.

In Nepal, the Science Equipment Centre is engaged in the development and production of innovative, prototype educational materials. Emphasis is being given to science, mathematics and vocational subjects. Also, the Centre for Educational Research, Innovation and Development as well as the Curriculum, Textbook and Supervision Development Centre of Nepal have stimulated new approaches in the development of low-cost educational materials.

In Malaysia, systematic development of educational materials for all subject areas takes place in the Curriculum Development Centre and the Educational Media Service Section of the Ministry of Education. There are some development activities in the universities and teachers' education, but their impact on the national scene is minimal.

In India, the design and development of science materials is well established, but this is not so of materials in other subject areas. At the national and State centres for research in educational technology, micro-level research is being conducted. Local industries are closely involved in the development of materials.

In Japan, the Tokyo Institute of Technology and the National Institute for Educational Research (NIER) are involved in research in educational technology.

Their works cover all subject areas, and the prototypes developed are given to local industries without any royalty being charged.

In Pakistan, the curriculum wing of the Ministry of Education, the Allama Iqbal Open University and the Audio-Visual Centres in the provinces are producing various educational materials.

In the Philippines, there are a number of curriculum development centres, including those in the universities and teacher training colleges, which are involved in the design and development of low-cost educational material. The focus is on materials for communication arts, social studies, and mathematics.

There are large variations in the standard of research in educational technology. Japan stands out as a country where many innovative ideas are emerging and systematic and valid data are available on the effectiveness of the materials and strategies developed. Due consideration is also given to the psychological models for developing hypotheses and testing the effectiveness of educational materials. Such quality research is applied to some extent in India, in the area of science materials. It can be said that in all other countries such quality research is only just starting.

A number of innovative ideas on educational materials are being tried out in Malaysia and the Philippines. Although there is some feedback on their effectiveness, it is not collated as systematically as it should be, with due consideration to experimental design aspects.

In Nepal, emphasis is needed on the proper designing of educational materials in relation to the curriculum and child development. To promote and co-ordinate innovative development of low-cost educational materials, some significant steps have been taken in Nepal by such agencies as the Centre for Educational Research, Innovation and Development, the Curriculum, Textbook and Supervision Development Centre and the Institute of Education. Another major problem is the limited participation by local industries in the design and development of relevant low-cost educational materials. This may be due to their greater interest in profit rather than service to the schools. This is also the case of Afghanistan.

Finally, in Afghanistan, Malaysia and Nepal, there is a need for greater involvement of qualified people in the development and evaluation of educational materials.

3. National constraints affecting educational technology

The constraints existing in the different countries seem to vary, but there are some problems requiring similar solutions common to a number of countries.

The constraints can be broadly grouped into eight categories, namely: financial; availability of the required raw materials in the locality; expertise and manpower needs; relevant local industries and technical know-how; efficient management; physical facilities; distribution and transportation of materials; and the professional commitment of teachers.

All the participating countries, except Japan and Malaysia, do not have sufficient funds made available to the schools for purchasing the basic materials in adequate quantities. In Malaysia, while enough financial allotment is given to

schools, it appears that the funds are not fully utilized. In Japan, over-abundance rather than shortages is a problem. The government is planning to supply more audio-visual equipment and other teaching aids such as response analyzers. In Nepal, due to the shortage of trained teachers especially in the remote areas, educational materials and supplies are not utilized to the best advantage.

Japan, Malaysia and the Philippines do not have any serious problems with regard to the availability of raw and processed materials like paper. In other countries where raw materials for the production of low-cost educational materials are inadequate or limited, the materials needed are purchased from commercial agencies. In Afghanistan and Nepal, there appears to be a considerable shortage of basic materials for production. In India, while paper is locally available, it is still an expensive item.

In India, Japan and Pakistan the availability of expertise in educational technology and related matters is not a serious problem. In Malaysia, where there is a limited number of trained educational technologists, the problem is being solved, through training programmes and directing the attention of other trained and qualified personnel to problems in educational technology. A similar situation prevails in the Philippines. In Afghanistan and Nepal, there is a shortage of trained manpower. In addition to this, Nepal faces a problem of insufficient co-ordination among the various agencies related to materials development, training of personnel and distribution of materials. Although Malaysia also faces a similar problem, there is now a conscious effort to bring together the different groups of people involved in educational technology, so that better co-ordinated efforts will help the development of low-cost educational materials.

The existence of local industries and technical know-how for the large scale production of educational materials is not a serious problem in India and Japan. While this is also true in the case of Malaysia and the Philippines, industries for the production of software are not numerous. In Nepal, such an infrastructure has not yet come into existence.

The management problem does not arise in countries where the schools do not have many educational materials. In Japan, where there are abundant materials and facilities, there appears to be no serious management problem. However, the problem seems to be more in the attitude of the teachers and teacher unions towards non-traditional uses of educational materials. In Malaysia, where there are plenty of materials in the classrooms, organizing their utilization and replenishment is quite a problem.

Inadequate physical facilities is a problem in all the participating countries except in Japan and perhaps in Malaysia. Storage space is not enough, classroom furniture is inadequate, stationery materials and such basic facilities as typewriters and printing machines are not available in the other countries' schools.

While distribution of materials is not at all a serious problem in Japan and Malaysia, in Afghanistan and Nepal there are some transportation difficulties. There are about seven thousand islands in the Philippines and this makes the transportation of materials rather slow and difficult. In almost all the countries there are educational radio broadcasts, but only in Japan, Malaysia, Pakistan and

to some extent in India are there also educational television broadcasts. Almost all countries produce educational newsletters and journals, but there is considerable variation in the quality, quantity and availability of these at the school level.

In almost all the participating countries, there appears to be lack of focus on educational technology during teacher training. In Japan, there is now increasing emphasis on educational technology in teacher training, but, while there are courses in educational psychology and programmes for training teachers on how to use educational materials and hardware, there are no courses where both are brought to bear upon each other. In India, there is an emphasis on teacher training and funds have been allocated for in-service courses, workshops and seminars. A similar trend is noticeable in Malaysia and the Philippines. Workshops and seminars are also becoming popular in Afghanistan, Nepal and Pakistan.

4. **Attitudes and values of teachers, parents and the community, and their involvement in the development of low-cost educational materials**

The effective development of low-cost educational materials depends to a large degree upon the responsible persons who are directly involved in the programme. The human and material resources in the community or in the local environment are factors which contribute extensively to the success of the programme. The knowledges, skills, and capabilities of teachers, parents and other persons in the community are basic in pushing through the programme of development, but attitudes and values and the maximum involvement of these responsible persons are equally important. In this workshop, particular attention has been focused on the attitudes and values of teachers, parents and the community.

Teachers. The teacher's awareness of the importance of using educational materials in teaching/learning situations is required for effective use of such materials. To minimize the cost of educational materials, teachers' attitudes toward using low-cost materials should be positive. They should adopt innovative strategies which promote the use of low-cost educational materials. Their creativity and imaginativeness in developing and using available materials are important. Better relations between the community and school, and the teacher's pride and satisfaction in using available low-cost educational materials are important. However, such an ideal situation does not seem to exist in all the participating countries.

The information taken from the participating countries reveals the following basic attitudes and values (Table 1).

Table 1: Attitudes and values of teachers and their involvement in the development of low-cost educational materials in the participating countries

Teachers' attitides, values and involvement / Country	Afghanistan	India	Japan	Malaysia	Nepal	Pakistan	Philippines
1. Awareness of importance of using educational materials in teaching/ learning situations	S	S	S	S	S	NI	VS
2. Adoption of innovative strategies which promote the use of low-cost educational materials	NI	NI	NI	NI	NI	S	VS
3. Creativity and imaginativeness in the use of available resources	NI	NI	S	NI	NI	NI	S
4. Resourcefulness in recycling of discarded materials	S	NI	S	NI	NI	NI	S
5. Optimum use of locally available materials	S	NI	NI	NI	NI	S	S
6. Pride and satisfaction in utilizing locally produced low-cost educational materials	NI	NI	NI	NI	NI	NI	S
7. Relations between school and community	NI	S	NI	NI	VS	S	S

VS = Very satisfactory; S = Satisfactory NI = Needs Improvement

Note : The table above shows the existing situation in different countries as discussed during the workshop and should not be treated as a comparative assessment.

Parents and community. The parents and the community have vital roles in the successful development and utilization of low-cost educational materials. The local community is a great source of raw materials as well as ready-to-use low-cost educational materials. The full co-operation of the parents and the community makes the development of low-cost educational materials possible. Again, there are differences in the attitudes of parents and community to the development of educational materials.

Some important attitudes and values of parents and the community in the participating countries are shown below:

Table 2. Attitudes and values of parents and community and their involvement in the development of low-cost educational materials in the participating countries

Attitudes, values and involvement / Country	Afghanistan	India	Japan	Malaysia	Nepal	Pakistan	Philippines
Parents							
1. Awareness and understanding of educational materials	S	S	S	NI	S	NI	VS
2. Optimum use of available educational materials	S	NI	NI	NI	NI	NI	S
3. Co-operation with teachers	NI	NI	NI	NI	S	S	S
4. Satisfaction and pride in providing maximum learning opportunities for their children	S	NI	VS	NI	NI	S	VS
Community							
5. Knowledge and understanding of educational materials	S	NI	S	NI	NI	NI	S
6. Co-operation with the schools schools	VS	S	S	S	S	NI	S
7. Making available to the schools the available community resources	S	NI	NI	NI	NI	NI	S

VS = Very satisfactory S = Satisfactory NI = Needs improvement

Note : The table above shows the existing situation in different countries as discussed during the workshop and should not be treated as a comparative assessment.

5. Management of educational materials

The management of educational materials is one of the basic factors which affects their effectiveness in the classroom. Serious attention should be given to the production, distribution and utilization as well as the storage, repair and maintenance of educational materials. Management activities may be undertaken at the national and at the school on local level.

The situation in the participating countries regarding the management of low-cost educational materials is given in the following table:

Table 3. The current situation regarding the management of educational materials in the participating countries

Level	National Level							School/Local Level						
Management activities \ Country	Afghanistan	India	Japan	Malaysia	Nepal	Pakistan	Philippines	Afghanistan	India	Japan	Malaysia	Nepal	Pakistan	Philippines
Production	S	S	NI	NI	NI	S	S	NI	S	S	NI	NI	–	VS
Distribution	NI	S	S	NI	S	S	S	NI	S	S	NI	S	–	S
Utilization	S	NI	S	NI	NI	S	VS	S	NI	NI	NI	NI	S	VS
Storage	S	NI	NI	NI	S	S	NI	S	NI	S	NI	S	S	NI
Repair and Maintenance	S	NI	NI	NI	NI	S	NI	NI	NI	S	NI	NI	S	NI

VS = Very Satisfactory S = Satisfactory NI = Needs Improvement – = No information

Note: The table above shows the existing situation in different countries as discussed during the workshop and should not be treated as a comparative assessment.

6. Mechanisms for the dissemination of low-cost educational materials

Successful development of low-cost educational materials depends, to a large extent, upon the mechanisms for dissemination of low-cost materials. Dissemination should promote or develop an intense awareness of the important role which educational materials have in increasing the quality of children's learning. The essential knowledges, skills and competencies as well as the interest of the persons who are directly involved in the development programme are basic in the promotion of low-cost materials. This can be achieved by the maximum involvement of the educational institutions for the pre- and in-service training of teachers; the implementation of effective school curricula, especially in the elementary and secondary schools; and the help of supporting institutions such as research centres, curriculum development centres, learning resource centres, training centres, professional associations or organizations, parents and women's clubs, the educational media such as television and radio programmes, films, slides and professional publications. Professional recognition, awards and incentives for teachers also promote the dissemination of low-cost educational materials. Professional observation, tour and visits are factors to consider. Again there are some differences and similarities among the participating countries in their dissemination activities.

The following table indicates the different mechanisms and the level to which they are utilized:

Table 4. The current situation regarding the dissemination of educational materials in the participating countries

Mechanism \ Country	Afghanistan	India	Japan	Malaysia	Nepal	Pakistan	Philippines
1. Educational institutions							
1.1 Teacher Training							
a) Pre-service	S	S	NI	S	NI	S	S
b) In-service	S	S	VS	S	NI	S	VS
1.2 School	S	NI	NI	S	S	S	VS
2. Support institutions							
2.1 Research centres	NI	NI	S	NI	S	NI	S
2.2 Curriculum development centres	S	S	NI	S	S	S	VS
2.3 Learning resources centres	NI	–	S	NI	–	–	S
2.4 Pilot training centres	S	S	–	NI	S	S	S
2.5 Professional associations, clubs, etc.	S	S	S	NI	–	S	S
3. Educational media							
3.1 Television	NI	S	S	S	–	NI	NI
3.2 Radio	NI	NI	S	S	NI	NI	NI
3.3 Films/slides	NI	NI	S	S	NI	NI	NI
3.4 Professional publications	NI	S	S	S	NI	S	S
4. Others							
Professional recognition	NI	S	S	S	S	–	S
Awards or incentives	NI	S	NI	S	S	NI	S
Professional observations, tours and visits	S	NI	S	S	NI	NI	S

VS = Very satisfactory S = Satisfactory NI = Needs Improvement – = No information

Note : The table above shows the existing situation in different countries as discussed during the workshop and should not be treated as a comparative assessment.

7. The role of the educational administration and other agencies in the promotion of educational technology

The important role of educational administrations and other agencies in the management of educational technology is increasingly recognized in the participating countries, and this was strongly reflected in the reports submitted by the participants. As understood by the administrations in the participants' countries, educational technology appears to be an enterprise where costly, complicated, highly

sophisticated but rarely available modern gadgets, like television, teaching machines, VTRs, films, filmstrips, slides and transparencies are used for instruction. Generally, they have not yet realized the significance of low-cost educational materials, which can easily be introduced into the teaching/learning situation with comparatively little administrative difficulty.

a) **The present educational administration set-up.** In most of the participating countries, the administrative set-ups for education have similarities. Changes have taken place to meet the increasing pressure of population and some deviations arise from technological advancement within the countries. Apex organizations have been set up to improve and modernize the educational system, like the central boards of education, State or provincial directorates and district centres of education, and several other organizations and institutions like the Council for Educational Research and Training in India, the Curriculum Development Centre and Educational Media Service in Malaysia, the Curriculum, Textbook and Supervision Development Centre in Nepal and the Curriculum Development Centre in the Philippines. In India, Pakistan, and the Philippines and to some extent in Malaysia, Nepal and Japan, private institutions of learning contribute to the improvement of education in the country.

In Afghanistan, the production of low-cost kits and models is managed directly by the Ministry of Education. In India, kits are developed, produced and distributed by the NCERT. In Nepal, the Science Equipment Centre develops and mass produces science materials. Science kits of low-cost, simple materials are being developed and distributed by the Science Education Centre, the University of the Philippines, and the Ministry of Education and Culture in the Philippines. The National Educational Equipment Centre, in Lahore, Pakistan, and the Tokyo Institute of Technology are also concerned with the overall development of educational technology.

b) **The administrator's background and attitude towards educational technology.** It was observed that the execution of the policies and programmes in most of the countries is left to administrators who are generally tradition-oriented. At the higher level, they are drawn from various administrative services that have little to do with education. In exceptional cases, people have risen to position after years of active service as teachers or academicians. Misconceptions, lack of orientation and reluctance to accept innovative approaches slow down the promotion of educational technology, especially the development of low-cost educational materials.

c) **Requirements for the effective administration of educational technology programmes.** Educational technology is a comparatively new concept in education. It demands a high level of understanding, competence, and awareness, plus a positive attitude towards improvement in the educational system.

In developing countries, the stress is on teacher-made low-cost, simple educational materials in which environmental resources are utilized to the maximum. The local customs, traditions and cultural heritage provide rich curricular content. In this context, encouragement, guidance and support from the authorities are necessary. Educational administration is complex and requires a good understanding of the learning processes, behavioural attitudes, psychology of learning and

aspects of other disciplines connected with teaching/learning processes. In addition, effective management of human and material resources, competencies in setting up strategies for effective development and utilization of services and physical facilities are also required.

d) **Other agencies supporting educational technology activities.** Quality education in any country is the concern not only of the school systems alone, but also of other concerned agencies in the government. Realizing the need and the urgency, numerous agencies voluntarily support certain activities and specific programmes in education. Supportive institutions and organizations are also created in most of the countries to help the government's effort, such as media centres, television and radio broadcasts, museums of various kinds, art galleries, libraries, cultural centres; centres for children like Bal Bhawans in India and the children's centres in Japan; special institutes like the Community Science Centre at Ahmedabad in India, the National Science Development Board (NSDB) and special science high schools in the Philippines.

Civic organizations, youth and social clubs, international organizations like the Lions Clubs, Jaycees (Junior Chambers of Commerce) and Rotary Clubs extend some financial assistance and services to educational projects. In most of the participating countries, various religious organizations or missions support educational programmes for the benefit of the less fortunate groups, and commercial or business organizations sponsor scholarship programmes and occasionally support educational projects.

In most countries, much have been contributed by Unesco through APEID and its other subsidiaries by organizing seminars, workshops and exchange visits, to promote the development and employment of low-cost educational materials with the maximum use of locally available resources.

e) **Co-ordination in the administration of educational technology.** In any task, proper co-ordination is required at all levels. The leadership, initiative and creativity of educators who develop new ideas must be fully utilized. Decision-making at the administrator/instructor/supervisor levels is often time-consuming, which in turn delays the work initiated by the numerous agencies concerned with developing programmes on low-cost educational materials. Such practices have to be remedied, possibly by relaxing the rigid rules and regulations common in some of the participating countries.

In conclusion, if each country has set goals to improve the quality of education, the recognition of the role of educational technology will hasten the achievement of such goals. More concerted efforts by school administrators and administrators of supportive agencies are essential in effecting the promotion and development of low-cost educational materials. More attention should also be given to technical and professional courses, which could be the responsibility of the present education administration. They could be disseminated and explained to the educational planners of the concerned countries, perhaps through the help of an international agency.

Chapter Four

GUIDELINES ON DEVELOPMENT OF LOW-COST EDUCATIONAL MATERIALS

During the sub-regional workshop, seven major problem areas were selected, a synthesis was made of the relevant experiences of the participating countries (see Chapter III), and a set of guidelines for each area were arrived at. These guidelines are broad, conceptual ones only. It is hoped that the Member States, in the planning and implementation of their educational programmes, will be able to formulate their own schemes and strategies using the guidelines presented in this section.

1. Educational technology for child development

From the synthesis of the country reports, two basic problems in this area emerged: educational technology activities being mainly oriented towards imparting knowledge and less towards child development; and the absence of learning theories and theories of child development in the activities of educational technology.

The following measures were suggested to deal with the first problem area, i.e. orienting educational technology activities towards child development:

a) To develop creative thinking and inculcate a problem solving attitude, experimentation on effective ways of organizing and managing the classroom as well as the lesson should be encouraged. For example, the open school system, non-graded classes, team teaching and other innovative approaches can be tried with the optimum use of educational materials, games and toys.

b) In the schools there are different types of person-to-person interactions such as teacher-to-pupil, pupil-to-pupil and teacher-to-headmaster. Such interactive systems should be so channelled that the atmosphere in the school be conducive to the self-directed development of the child.

c) Active research on making learning more enjoyable should be carried out and techniques for actively stimulating and sustaining interest explored. Centres—such as a child media centre—could be established specifically for the purpose of focusing on learning that takes place outside the school.

d) Measures should be taken to influence and inform parents through pamphlets, books and films, about basic aspects of child development, so that the parent-child relationship be improved and help the active development of the child.

e) There must be a special emphasis on games and plays as part of instructional strategies for fostering child development. National centres for

research in educational technology could develop new games and toys for various aspects of child development, e.g. fostering body co-ordination, manual dexterity, eye-hand co-ordination, the discrimination skills, co-operation and leadership.

f) Systematic studies and surveys of traditional, local games and toys, together with descriptions and instructions, may serve to arouse an awareness and understanding among parents, teachers and other educators of the importance and relevance of such activities to child development.

g) Exhibitions of traditional and new toys and games for various age levels may also serve the same purpose as above.

h) Teacher trainers should attempt to impart an educational ideology that emphasizes the total development of the child as an essential goal of education. The teachers should be trained to be resourceful, imaginative and well-informed, to enable them to foster child development through the optimum use of educational technology.

For the second problem area, i.e. providing child development theories as part of the activities of educational technology, the following suggestions were made:

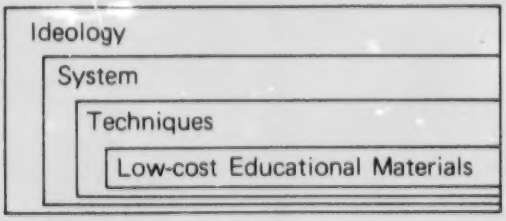
a) Intensive training in child psychology and child growth and development for educational technologists and training in educational technology techniques for psychologists be recommended.

b) Educational technology should be considered as a discipline which makes a teacher a professional. This emphasis on the professional importance of educational technology for teachers will help to generate greater interest in research in educational technology. The standard of research and involvement can be raised by including educational technology as an important component in teachers' conferences and meetings.

c) Institutes of educational research should invite papers on educational technology and its relevance and importance to child psychology and give them proper recognition. In this way the role of educational technology can be directed to child development.

d) The development of low-cost educational materials does not take place in a vacuum. It is a decision which is tied in with how children should be taught, in turn leading to the adoption of a particular mode of organization, e.g. the open school system. This implies certain specific strategies and techniques in the development of particular types of low-cost educational material.

This mode of operation for low-cost educational materials may be adopted for implementation:



e) To develop depth in understanding educational technology, courses should be offered in teacher training institutions along the following lines:

i) Basic principles, theories, and practices in educational technology;

ii) Design, development and evaluation of low-cost educational materials;

iii) Practical training in the use of audio-visual hardware and software;

iv) Training on how to assess student understanding and responses, for monitoring the effectiveness of teaching with low-cost educational materials.

2. **Design, development, utilization and evaluation**

The bulk of educational materials developed are on science and mathematics, while the social sciences and language arts are often overlooked. Accordingly, the following suggestions were made:

a) Elementary school teaching/learning activities should be so arranged that communication skills are also developed, using educational materials to the fullest.

b) Workshops should be conducted to develop kits or packages for social sciences and communication arts. These kits might include puppets, toys, study prints, tape recording of speeches, slides and brochures.

The level of research in educational materials in many participating countries is still not of a high quality. For this, the following activities were suggested:

a) As far as possible researchers in educational technology should incorporate elements of experimental design of low-cost educational materials in their work.

b) There should be more intensive, systematic evaluation while developing new materials or new strategies for teaching or organizing a lesson. In particular, the effect of the materials and strategies in maintaining curiosity and interest should be assessed.

3. **National constraints and possible remedies**

During the workshop a number of problems were identified. Special note was taken of the shortage of expertise and manpower, and the negative attitude of teachers towards educational technology.

In order to overcome the shortage of expertise and manpower, the following strategies were proposed:

a) At present, research in educational technology is highly centralized in special institutions, and this deprives teachers of an opportunity to participate actively. By decentralizing research in educational technology and dispersing it among the teaching profession, more teachers can be drawn into it. District level or State level workshops and seminars on educational technology, where most of the participants are teachers from schools, would also benefit. Such a programme should be accompanied by special courses in educational technology for the deserving teachers.

b) International agencies such as Unesco have an important role to play. In the training of personnel, they can organize more study tours, attachment programmes, seminars, workshops and training courses. They can also send resource persons to work on special projects and train local personnel in the course of completing the projects.

To remedy the negative attitude of teachers towards educational technology, especially towards low-cost educational materials, the following measures were considered:

a) The courses in teachers' colleges might be reorganized, with the aim of improving actual teaching strategies. Teacher trainees should learn how to improve their teaching procedures while in training. Micro-teaching with the optimum use of low-cost, simple educational material should be used as often as possible.

b) Competence in using educational materials should be strengthened in a number of ways. Demonstration classes that emphasize the use of educational materials should be held regularly for teachers in training as well as for tradition-oriented teachers. Periodic supervision of teaching/learning situations is also recommended.

c) The teacher trainers should be made aware of actual school programmes and situations. This could be done through an exchange programme which makes it possible for them to teach in some schools now and then. Were this to be practised, the guidance of the professional lecturers in teachers' colleges would strike the trainees as more relevant and practical.

d) Instead of subjecting teacher trainees to lectures on the components of good teaching, they should be exposed to practical demonstrations of good teaching as often as possible. This will enable the trainees to grasp the principles of good teaching through a process of observation and imitation.

4. Strengthening the attitudes, values and involvement of teachers, parents and the community

Basic to the effectiveness of low-cost educational materials is the quality and extent of involvement of teachers, parents and the community in the development programme. The following guidelines were drawn up to strengthen their attitudes, values and involvement. (Table 5)

5. Management of educational materials

The effectiveness of educational materials depends largely on the quality of their management. During the workshop it was agreed that particular attention should also be given to the production and distribution of educational materials. In this respect, methods to minimize wastage caused by inadequate storage, repair and maintenance were also suggested. These methods were classified under four headings: production, distribution, storage, and repair and maintenance.

Table 5. Guidelines for improving the attitudes, values and involvement of teachers, parents and the community

Teachers	Parents	Community
1. In-service training programmes: workshops, seminars, conferences, demonstrations by experts and specialists, study tours and visits.	1. Orientation programmes: informal study groups, meetings, conferences; demonstrations on the use of educational materials; school and class visits; and school exhibitions and fairs.	1. School-community projects: contests and competititons in the development of educational materials; exhibitions and fairs on educational materials by commercial agencies; demonstrations by specialists and experts; making school facilities accessible to community activities; and community festivals and celebrations.
2. Exposure to various types of educational materials: exhibitions and school fairs, trade fairs, films and slides, publications, bulletins and reports.	2. Socio-civic organizations: parent-teacher associations, women's club, social welfare associations.	2. Educational media: TV and radio programmes, newspapers, publications, reports.
3. Professional recognition: awards, promotion and advancement, scholarships and grants.	3. Educational media: TV and radio programmes, newsletters, reports, publications.	3. Competitions and contests in the development of educational materials by commercial agencies.
4. Competitions and contests on the construction of prototype educational materials and the designing of low-cost educational materials and toys.		
5. Community-school development programmes via: parent-teacher associations, and making school facilities accessible to the community.		

Production

Production in schools. Production of educational materials in schools is usually done by teachers with the help of pupils and some parents. Students of upper grades and local craftsmen also produce educational materials.

To strengthen production at this level the following guidelines were formulated:

a) Conduct in-service and pre-service teacher training programmes;
b) Organize workshops of small groups of teachers;
c) Arrange exhibitions, displays and school fairs;
d) Publish handbooks, booklets for teachers and for students; and
e) Give proper remuneration or awards for innovative ideas.

Mass production agencies

a) **National and regional agencies.** National policy in the orientation of technicians involved in production should be emphasized;
b) **Commercial manufacturers.** Through meetings, conferences and exhibitions, agents should be familiarized with relevant educational materials for the schools. Encouragement should be given for the mass production of low-cost educational materials.

Distribution

To bring about improvement in the distribution of the materials at the national and regional levels the following steps were suggested:

a) The budgetary allotment should be increased for transportation and delivery; and
b) Trained personnel must take charge of the handling and distribution system.

For the distribution of educational materials by commercial agencies, it is considered important that the agents should designate a properly trained person to take charge of the distribution and to strengthen relations with schools, in order to meet their needs.

Storage

Storage of educational materials occurs at the national, regional and school levels. For the improvement of the storage facilities, the following points were made:

a) The store-room should be kept dry and well ventilated;
b) The roof should be made leak-proof;
c) Direct sunlight should be avoided in the case of chemicals and sensitive materials;
d) The storage space should be accessible to teachers, pupils and other users; and
e) The stored articles should be secure and safe from damage and losses.

Repair and maintenance

The national and regional institutions, the schools and the commercial agencies represent the three levels at which the repair and maintenance of

educational materials may be undertaken. The following proposals were made:

a) It was recommended to train teachers to repair and maintain educational materials produced in the schools. Local craftsmen could also be employed for this work;
b) A directory of individuals and firms undertaking repair work of educational equipment should be prepared for ready reference.

6. **Mechanism for the dissemination of educational materials**

The participating countries called for improvement in making the value of educational materials in teaching/learning situations more widely known. For a more workable programme of dissemination, the following strategies were proposed:

a) Publication of professional magazines, booklets, handouts, leaflets and the like describing the design, development, use and evaluation of low-cost educational materials for teachers and administrators.
b) Extensive use of educational films, filmstrips and slides emphasizing the need for and importance of low-cost educational materials in the educational development programmes.
c) Teacher exchange programme.
d) Displays of low-cost educational materials and literature in school exhibitions and fairs.
e) Inter-country visits to educational technology centres and to associations undertaking relevant projects.

7. **Educational administration and other agencies involved in the promotion of educational technology**

Success in the promotion of educational technology depends upon the managerial effectiveness of the educational administration. At present, not all of the educational administrators are open-minded, well-informed and fully aware of the importance of educational technology. Usually, the academic type of administrators controls the development of educational technology, while the non-academic administrators only get involved to the extent their services are needed. The following tables present the administrators' basic functions at various levels, constraints that hinder the promotion of educational technology and guidelines which may help in the effective promotion of educational technology.

Table 6. The administration of educational technology: functions, constraints and guidelines

Educational administrators	Constraints that hinder promotion of educational technology	Guidelines for effective promotion of educational technology
A. Non-academic administrators		
a) Finance/budget officers b) Personnel officers c) Supply/property officers	a) Lack of awareness of the importance of educational technology b) Indifference	a) Participation in workshops, seminars, orientation programmes associated with educational technology

Educational administrators	Constraints that hinder promotion of educational technology	Guidelines for effective promotion of educational technology
A. Non-academic administrators (cont'd)		
	c) Strict and rigid rules and regulations	b) Flexibility in the interpretation of rules and regulations to minimize red tape and to speed up transactions
	d) Limited information about classroom situations	c) Observation and visitation in classroom teaching situations
	e) Inadequate funds	d) Programme priority needs of the school system
	f) Lack of awareness of priority needs for educational technology	e) Involvement in curriculum development programmes and projects aside from specialized field
	g) Inadequate physical facilities	f) Provision of needed basic physical facilities
		g) Budgetary adjustments for educational technology projects and materials
B. Academic administrators		
a) Teacher educators b) Inspectors/supervisors c) Headmasters or principals d) Others	a) Inadequate training in educational technology b) Lack of understanding of educational technology and its importance c) Poor attitudes, lack of interest and initiative d) Lack of co-ordination among different types of supervisors and inspectors e) Vested interests in particular subject areas f) Inadequate skills and competences g) Shortage of funds/resources h) Unwillingness to get help or co-operation from among other agencies/ departments or fellow supervisors and staff members i) Non-involvement with outside activities related area of work	a) Proper placement and training for the right job b) In-service training on educational technology with emphasis on production of low-cost educational materials c) Training on fundamental skills required in educational technology, e.g. operation of different kinds of projectors, preparation of transparencies, and preparation of simple graphic materials d) Provision of manuals and guides on educational technology, with emphasis on low-cost educational materials e) Attendance in short courses on educational technology to up-date knowledge and values f) Offering courses on the preparation and utilization of low-cost educational materials g) Attendance in workshops, conferences and seminars on educational technology h) Contracting or hiring the services of local craftsmen, technicians, and experts i) Co-ordination with other agencies for promotion of low-cost educational materials j) Arranging visits, e.g. inter-school, inter-district, and inter-states, to exchange and share ideas and experiences k) Making available readings and information about modern trends and issues in educational technology

Educational administrators	Constraints that hinder promotion of educational technology	Guidelines for effective promotion of educational technology
B. Academic administrators (cont'd)		
		l) Initiating and organizing exhibits on educational technology, especially on low-cost educational materials
		m) Seeking funds from other sources to promote educational technology
		n) Supervising maintenance, repair and replenishment of educational technology facilities and materials
		o) Updating AV room facilities and materials
C. Other administrators and specialists		
a) Subject specialists	a) Lack of awareness and understanding of the importance of educational technology	a) Participation in orientation sessions, workshops and seminars related to educational technology
b) Curriculum planners	b) Inadequate skills in relation to educational technology	b) Provision of training on fundamental skills required in educational technology
c) Curriculum/and textbooks writers	c) Indifference	c) Organization of the skills and services of curriculum experts and writers in relation to educational technology
d) Illustrators/artists	d) Limited opportunities for participation in educational technology activities	d) Utilization of the skills and services of local illustrators and artists in designing and producing low-cost educational materials
	e) No time scheduled for involvement in educational technology programmes	

The various agencies operating in the participating countries can contribute much to the success of the promotion of educational technology programmes. They must be made aware of the importance of their contribution towards the efforts for the universalization of education.

Table 7. Other government agencies, associations and institutions involved in the administration of educational technology

Agencies	Constraints which hinder the promotion of educational technology	Guidelines for the promotion of educational technology
A. Government		
Media Centres	a) Lack of awareness and understanding of the importance of educational technology	a) Maximum involvement in aspects of educational technology (designing, development, production and evaluation)
Radio/TV set-ups	b) Lack of information about developmental needs of schools	b) Involvement in educational technology workshops and seminars
Museums	c) Underuse of services because of lack of information on co-ordination	c) Radio and TV coverage of educational technology workshops
Libraries	d) Limited opportunities for participation in educational technology projects and programmes	d) Participation in school projects
Cultural centres		e) Exhibitions of low-cost educational materials
Science centres		
Children's centres		
Art galleries		
Public information departments		
Tourism departments		

Agencies	Constraints which hinder the promotion of educational technology	Guidelines for the promotion of educational technology
A. Government (cont'd)		
		f) Establishment of resource centres and mobile libraries, as well as other facilities fo educational materials
		g) Provision of more reading materials on educational technology
		h) Dissemination of relevant information or topics through radio, TV and newspapers
		i) Encouraging the development of low-cost educational materials
B. Association		
Rotary, Lions and Jaycees associations Youth clubs Teachers' associations Parents' associations Women's clubs Others	do	a) Providing expertise b) Helping raise funds for projects of educational technology c) Supporting scholarships and study grants d) Helping establish resource/learning centres and facilities for educational materials e) Donating reading materials to resource learning centres
C. Commercial		
Business establishments Public enterprises Printing and publishing houses Oil companies Airlines Tour agencies Others	do	a) Involvement in school projects b) Provision of illustrated literature like maps and travel brochures c) Acting as resource persons to workshops/classes d) Sponsoring exhibits of low-cost educational materials e) Sponsoring contests f) Sponsoring scholarships and study grants g) Publishing and distributing books and literature in major languages on educational technology
D. Philanthropic		
Institutions Foundations Others	do	a) Involvement in school projects b) Sponsoring study grants and research projects on educational technology c) Donating funds or materials for school activities
E. Religious		
Religious organizations Missionary projects	do	a) Involvement in school activities and projects

Agencies	Constraints which hinder the promotion of educational technology	Guidelines for the promotion of educational technology
E. Religious (cont'd)		
		b) Attendance at workshops and seminars on educational technology
F. International		
Unesco UNICEF British Council USIS ICA Red Cross Others	a) Communications and language constraints b) Limited information regarding school projects where such agencies may be able to help c) Services not fully utilized	a) Sponsoring workshops and seminars on educational technology b) Providing funds and materials for school projects c) Providing expertise d) Supporting research studies related to educational technology e) Sponsoring study grants

Chapter Five

NATIONAL FOLLOW-UP PLANS

Based on the experiences and ideas shared among the participants and the variety of exhibits of low-cost educational materials produced in the national workshops, the relevance of low-cost educational materials to the improvement of teaching-learning situations was made clear. Local resources, including indigenous raw materials, folktales and games, culture and traditions were detailed and constraints on their use were identified. Pragmatic development programmes of low-cost educational materials were presented for appropriate action by the participating countries.

AFGHANISTAN

The importance of educational technology with special reference to low-cost and locally available materials has been already recognized in the educational system of the Democratic Republic of Afghanistan. Efforts were directed at using low-cost and locally available materials which function as effectively as the sophisticated and costly materials.

The concerned authorities decided to disseminate the idea of producing inexpensive educational materials through the already existing institutions like the National Science Centre and the Audio-Visual Aids Centre. Some locally available and inexpensive educational materials were included in the science kits, which were routinely produced and distributed by the two centres.

Unesco's proposal to finance and conduct the National as well as the Subregional Workshop came at the right moment as far as Afghanistan was concerned. The exchange of ideas and experiences on the development and utilization of low-cost and locally available educational materials proved to be beneficial to the participants of both Workshops.

Based on the ideas exchanged at these workshops, the following plans are suggested to implement and promote the development of low-cost educational materials:

1. Conduct workshops on the development, production and utilization of low-cost educational materials at national and provincial levels.
2. Hold regular conferences at the national and regional levels to promote low-cost educational materials in the school system.
3. Conduct seminars. The next seminar will take place in the province of Jalalabad, to involve elementary school teachers and to incorporate many of the ideas of the two workshops.
4. Add more low-cost educational materials to already existing science kits, including some of the innovations in educational technology.
5. Improve the pre- and in-service training of teachers, with special emphasis on the development and utilization of low-cost educational materials.

6. Disseminate the concept of educational technology with special reference to low-cost educational materials through the mass media, exhibitions and displays, and study tours or visits.
7. Prepare an instruction manual containing the necessary information on the design, development, production and utilization and evaluation of low-cost educational materials.
8. Solicit more help from Unesco and other international organizations, as this is considered indispensible in providing assistance for workshops and facilities.
9. Consider Afghanistan as a venue for a future APEID Regional Workshop. This may pave the way for more intensified production and utilization of low-cost educational materials.

INDIA

Low-cost educational materials in India are being produced at the national, State and school levels. The universalization of primary and adult education are the two priority programmes in India today, and low-cost educational materials are required for both. Their production is to be stepped up, as is the training of personnel to use them. As regional imbalances exist in school enrolment and in the achievement level of children, more attention is to be given to the educationally backward states.

High wastage and stagnation in the early primary classes also pose problems in India. It is therefore necessary to concentrate on the production of low-cost educational materials for young children in order to make education meaningful and joyful to them. The educational potential of local games and toys needs to be explored and used in the schools. Since children have much difficulty in language learning, efforts must be made to produce low-cost materials for this subject area. More systematic work is also needed in producing low-cost educational materials for social science. The production programme can be further strengthened by developing teacher's guidebooks and organizing teacher-training workshops.

Teacher training needs special attention. Production of low-cost educational materials will be effective only if teachers have sufficient knowledge and understanding of child development. Pre-service and in-service training of teachers should focus on the child, through the optimum use of educational technology. Recent research studies have shown that home variables play a very important role in the educational achievement of children in India. Keeping this in view, it is necessary to give some attention to the production of educational materials for parents too.

To achieve quality education, the orientation of key personnel on the values of low-cost educational materials is necessary. The powerful media such as television, radio, films and even programmed learning get the major share of attention and budget, whereas low-cost media such as play materials and games tend to be overlooked.

Development of low-cost educational materials

In India, commercial agencies are doing good work in the production of educational materials, and this also needs to be encouraged.

Keeping the above points in view, the following specific plans are presented:

1. Step up efforts to produce low-cost educational materials, particularly for the educationally backward states.
2. Survey traditional play materials and games for children, and prepare teachers' manuals spelling out their educational potential.
3. Produce suitably illustrated materials for the language development of children.
4. Strengthen science education by producing science kits and guidebooks for teachers in the development and understanding of low-cost educational materials for science education.
5. Begin devising and producing sufficient low-cost educational materials in the social sciences.
6. Conduct more in-service training programmes for teachers and teacher educators in devising and using low-cost educational materials for child development.
7. Develop suitable materials for orienting parents in the use of low-cost educational materials for child development and achievement. These may include pamphlets, slides and posters.
8. Create a lobby for such low-cost educational materials as games and toys so that they get their rightful place in educational technology.
9. Seek the co-operation of commercial agencies in increasing and improving the production of low-cost educational materials. Hold a national seminar for educators and manufacturers on producing educational material, with special emphasis on low-cost educational materials.
10. Hold a radio-scriptwriters' workshop on producing suitable radio programmes for young children.
11. Hold a workshop for illustrators of materials for young children.
12. Encourage professional associations, such as the Indian Association for Pre-School Education and the Indian Association of Teacher Educators, to promote the production and use of low-cost educational materials.
13. Give deserving and interested teachers travel grants for case studies on the effectiveness of educational technology in early childhood education, or for similar projects on child development and educational technology.
14. Organize contests for teachers in producing low-cost educational materials.
15. Encourage the setting up of display centres of low-cost educational materials at State levels.

JAPAN

The following plan will be seriously considered in order to push through the development of low-cost educational materials:

1. The participants in this Sub-regional Workshop will submit a report on the activities and results of the workshop to several associations in Japan, i.e.
   - The Technical Group on Educational Technology (Association of Electronics Communication Engineers of Japan). Specifically, it is proposed that this agency should conduct seminars four times a year concerning the development of low-cost educational materials.
   - Japan Educational Technology Association.
   - Japan Science Educational Society.
   - Japanese Science Education Association for Elementary Schools.
2. Present proposals to conduct workshops and seminars on the development of low-cost educational materials to these associations:
   - The CRADLE of the Tokyo Institute of Technology will continue development research on low-cost educational materials, especially on the development of materials for special education; and
   - The section for research and development of educational materials and aids in the NIER should continue with the collection and arrangement of information and materials on low-cost educational materials.
3. Make some prototypes of low-cost educational materials, as samples for school teachers throughout the nation.
4. Conduct temporary small group workshops to meet immediate needs.
5. Apply for funds from the government for a continuing programme on low-cost educational materials.
6. In order to intensify the plan for development of low-cost educational materials, certain projects could be presented to the Ministry of Education, Science and Culture, agencies and other institutions. Up to now, the Ministry of Education has been holding national workshops on audio-visual education. These workshops have produced good results in their own way. However, the Ministry of Education should try to initiate workshops on the development of low-cost educational materials. Another possible direction is through the national workshops in the National Education Hall of Tukuba Branch. It should introduce the development of low-cost educational materials among its courses.

   The first year's budget on this workshop should be about 10 million yen, 60 per cent for fundamental tools and 40 per cent for raw materials. The following years may need an allotment of about four million yen for a continuation of the project.

MALAYSIA

It is envisaged that the Ministry of Education, as a matter of priority, will channel its efforts and resources to promote national integration and unity through the implementation of a national language as the main medium of instruction in the schools. At the same time, the Ministry of Education will also divert its resources to improve educational facilities in the rural areas so as to remedy the imbalance in educational opportunities between them and the urban areas.

Development of low-cost educational materials

The specific priority areas in education that need attention and consideration are as follows:

1. Consolidate further the national education system in order to promote social, cultural and national unity.
2. Provide educational facilities for increased enrolment at all levels of education.
3. Enhance the quality of education at all levels through the improvement of curriculum content, methods, organization and other supporting services.
4. Place special emphasis on the sciences, technology and vocational education.
5. Provide trained teachers in sufficient numbers and of the highest attainable quality to meet the requirements of growth and qualitative improvements at all levels, including the in-service training of teachers.
6. Spread the educational opportunities more evenly throughout the country so as to correct the imbalance between the urban and rural areas, the rich and the poor.

Since the development of low-cost educational materials will contribute substantially towards achieving the stated goals, more research in this area will be encouraged. The following proposals are presented for the development of low-cost educational materials in our country:

1. Methods of increasing productivity:
   a) Arrange more national and State level workshops on the production of low-cost educational materials;
   b) Encourage teachers to organize their own practical sessions. Give them ideas and, where possible, other kinds of support to make their practical sessions more successful.
2. a) Formulate short- and long-term plans for the promotion of educational technology at the national level for appropriate action from the policy-makers;
   b) Create a national awareness of the importance of educational technology for improving the teaching/learning process, by using the educational mass media.
3. a) Propose research projects in educational technology that take into account the relevant elements of experimental design and encourage more such research in the context of curriculum development;
   b) Make a collection of interesting low-cost educational materials and organize exhibitions as a way of stimulating more interesting research in educational technology;
   c) Give due recognition to teachers who produce interesting and innovative low-cost educational materials.
4. Suggest changes in the curriculum for the teacher trainees so that great importance is attached to educational technology as has been conceived in this workshop.

NEPAL

Since the introduction of the plan for the national education system in Nepal, attempts have been made to emphasize the development and use of low-cost, simple educational materials as a part of the teaching/learning processes. The Curriculum, Textbook and Supervision Development Centre (CTSDC), the Science Equipment Centre (SEC), the Institute of Education (IOE), and the Centre for Educational Research, Innovation and Development (CERID) are the major agencies which have tried to promote the development and use of educational materials at the national level through workshops, by developing prototypes, and by initiating projects. Nepal is forging towards rural development through education. To relate education to real life experiences of the children and youth, a high priority is given to low-cost educational materials. It has been a policy of the government to establish a model school in each of the 75 districts in the Kingdom. One of the major purposes of these model schools is to harmonize education with the local environment. Therefore, it is proposed that these model schools should function as focal points for the promotion of low-cost educational materials.

The participants feel that the following strategies would effectively contribute to strengthen the development programme for low-cost educational materials in Nepal:

1. Prepare and implement a plan which would emphasize national development through a systematic dissemination of low-cost educational materials within the Model School Programmes in each district.
2. Make a survey of low-cost educational materials being used in various schools of the Kingdom and bring these ideas, materials, and developed prototypes within the reach of the teachers, supervisors and teacher educators at different levels.
3. Place greater emphasis on the development of low-cost educational materials together with innovative ideas and techniques in teacher training programmes.
4. Key persons working at different levels like CTSDC specialists, Regional Education Directorate Office (REDO), District Education Office (DEO), specialists, supervisors and IOE teachers, should be given the basic knowledge and skills in the development and use of low-cost educational materials.
5. A mobile workshop which is to be organized by CERID in collaboration with ACEID as a follow-up of the national as well as this sub-regional workshop should involve other related agencies such as the CTSDC, the Science Equipment Centre, teacher training institutions and research centres. The participation of persons who are directly involved in teaching should be ensured.
6. Strengthen and support the research on low-cost educational materials already initiated by CERID, through the collaboration of specialists in curriculum and materials development, teacher training and research.

PAKISTAN

The importance of self-reliance in educational technology was recognized many years ago in Pakistan. This led to the adoption of innovative approaches in making educational materials available to schools at lower costs, and in using locally available raw materials in the production of low-cost educational materials.

The National Educational Equipment Centre has been designing, developing and supplying equipment to schools regularly, while systematically expanding the coverage of subjects and disciplines. Although the application of low-cost technology is its main concern, the Centre is also endeavouring to introduce gradually the degree of sophistication necessary for the equipment to be standardized. The Centre's activities are supported and supplemented by the education extension centres, in-service training centres, the Institute of Education and Research, the Allama Iqbal Open University and the Pakistan radio and TV.

The introduction of teaching kits into the school curriculum is one of the goals of the Centre. For this purpose the curriculum wing of the Ministry of Education conducts periodic workshops for master trainers, who in turn train classroom teachers. The National Educational Equipment Centre has been designing, developing and producing teaching kits since 1976. Teacher-training in the use and maintenance of these kits is done through periodic workshops. The Centre plans to produce 100,000 kits by 1980 at the primary level alone. The evaluation and modification of such kits is also in progress. The Centre designs and develops prototypes of materials for the kits in its own facilities. It establishes the specifications, as well as the standards of quality of materials to be used in production, before mass production through commercial manufacturers is arranged.

To promote the use of low-cost educational materials, the following proposals are made:

1. All teachers must be familiar with the use of educational technology. The best way would be to include it as a requisite course in the pre-service teacher training curriculum.
2. Introduction of educational technology for in-service teachers should be through workshops, seminars and refresher courses specially arranged for master-teachers and supervisors.
3. It is essential that the use of low-cost technology be emphasized through publications which are widely circulated among the schools and communities.
4. National as well as provincial level training workshops for primary and secondary teachers in different subjects are in progress. Although the production of teaching aids is always an essential part of such workshops, it seems necessary that special emphasis be laid on the production of low-cost educational materials. The Allama Iqbal Open University and the Institute of Educational Psychology could both contribute effectively in the development of low-cost educational materials through their correspondence courses.

5. To promote the further development of educational materials, it is essential that models of educational equipment and prototype, low-cost technology be displayed at the existing educational centres. The local talent of the teachers could be tapped through regular competitions, prizes and awards for the development of low-cost educational materials using locally available materials.

PHILIPPINES

The following programme of activities is presented for consideration and action from 1979 to 1981:

A. **In-service projects**

1. Regional workshops on low-cost educational materials for elementary education. Since the national workshop held in Lemery, Butangas from 21 to 25 August 1978, four regional workshops have been conducted. Nine other regional workshops will be conducted during the school year 1979-1980. In most cases, echo workshops on the production, utilization and evaluation of low-cost educational materials are held at the school division level down to the district and individual school levels.
2. National workshop for secondary education. This may be held in co-operation with the Bureau of Secondary Education at a date and a venue to be approved by the Ministry of Education and Culture. Unesco assistance will be requested.
3. National workshop for teacher education. The co-operation and assistance of the Philippine Association for Teacher Educators (PAFTE), the Fund Assistance for Private Education (FAPE), and the Association of Philippine Universities Audio-Visual Centers (PUAVC) will be enlisted for this workship. It will be conducted in co-operation with the National Research and Development Center for Teacher Education (NRDCTE).
4. National seminar-conference on low-cost educational materials. This may be held during the first semester of the school year 1980-1981, at a date and a venue to be approved by the Ministry of Education and Culture. It will be attended by representatives who are actively involved in the development of low-cost educational materials from elementary and secondary schools and from colleges of education. Feedback, evaluation and research reports will be directed towards a strengthened and functional programme on low-cost technology. Assistance from Unesco will be requested.

B. **Organizational management and strategies**

1. Supervise educational media programmes in the regions and school divisions.
2. Activate learning resource centres and pilot training centres wherever feasible.
3. Prepare guidelines for field personnel on the optimum use of local resources in the development, utilization and evaluation of low-cost educational materials.

4. Contribute articles on the development of low-cost educational materials for publication in local professional magazines.
5. Encourage and assist school divisions to arrange school fairs or exhibitions of locally produced educational materials, children's projects and community products, as well as of commercial equipment and audio-visual materials.

Chapter Six

RECOMMENDATIONS

Any programme aimed at improving the quality of life in the Asian countries needs organized and concerted efforts at all levels of education. As the basis of a total plan for development, it is realized that the content of education is a key factor. The educational network and resources need effective management for maximum benefit. The experiences of the participants revealed that the deliberations in this Sub-regional Workshop considered the activities which are desired to be taken into account for the orientation of school administrators. Administrative support will prove helpful in implementing the planned programmes in educational technology. Universalization of education, at least at the primary level, is the goal set by developing countries. This calls for support at all levels, from the individual to national agencies. It demands effective administration of human and material resources. In developing understanding of the complex nature of education and specifically educational technology, awareness of its importance is necessary for co-ordinating the efforts being done at various levels. Despite of several constraints, effective functioning and development of educational institutions have to be managed. In the universalization of education, child development has to be focal centre of all actions. The existing attitudes, values and involvement of all those concerned with the operation of educational programmes need to be examined from all angles. Priority needs are to be met, outdated rules are to be changed or modified and minimum physical facilities to be extended. At the academic level, lack of interest, indifference, reluctance, and unwillingness to get help or co-operation are some factors which slow down the process. The educational aspects of the existing form of technology has to be brought in without losing sight of conserving the countries respective cultures and traditions. The purpose of small technology as presently practised required a further examination with a new dimension to learning for socialization.

This sub-regional workshop enabled the participants to bring together the knowledge, experience and skills valuable in formulating a concept of low-cost educational technology. It also provided the background necessary for future national and regional workshops. From the discussions and deliberations in the Workshop, it was seen that the teacher-training curricula may have to be broadened and in-service training programmes organized on a wider scale, to make the educational systems responsive to educational technology. The support and co-operation of the educational administration are essential to sustain continuing maximum participation of teachers and administrators.

Planned visits to schools and the community will strengthen the development of the design, production, utilization and evaluation of low-cost educational materials. Up-dating existing facilities and streamlining production, including that of small local craft industries and commercial agencies, is needed. Distribution, maintenance and storage systems have to be better supervised to reduce wastage. Research studies on recycling, maximum use of durable educational products and systematic supervision have to be undertaken for the improvement of the programme. The visual impact of the products should also be studied for the sake of aesthetics, which are often overlooked in educational materials.

Development of low-cost educational materials

It is expected that the insights provided by this workshop will increase the momentum towards maximizing the effectiveness of low-cost educational technology in the educational systems in our respective countries.

Recommendations

The participants of the Workshop arrived at a number of recommendations addressed both to the participating Member States and to ACEID/Unesco, which, if implemented, will promote further developments in the production and utilization of low-cost educational materials.

The following are the recommendations directed to the Member States:

1. The curricula for teacher training courses must be restructured so that a special focus is placed on relevant aspects of educational technology, both in pre-service and in-service courses.
2. Attempts must be made to involve parents and the community in the activities of the school system, especially in the development of low-cost educational materials.
3. Systematic surveys should be conducted on toys and games. Exhibitions of the materials will stimulate a greater use of toys and games in the classroom. Special research projects should be initiated to investigate the possibility of incorporating them as low-cost educational materials.
4. National competitions and exhibitions should be organized to stimulate and encourage active participation by teachers and students in the development programme for low-cost educational materials.
5. The establishment of special centres should be encouraged, to concentrate on the research, development and utilization of media for children. The focus should be not only on the in-school children, but also on others who drop out from school and those who have not gone to school at all.
6. The educational mass media or the mass media in general should be fully utilized to disseminate the concept of educational technology, with emphasis on low-cost educational materials, among teachers, parents and the community.

The following recommendations are directed to ACEID/Unesco:

1. The workshops that have been organized so far have focused mainly on the production of low-cost educational materials and on finding out the existing situation in relation to low-cost educational materials in the participating countries. Similar workshops dealing with related areas which are pertinent to the use of low-cost educational materials, e.g. strategies, techniques, classroom management, lesson sequencing, cueing and data on low-cost educational materials, could be incorporated either in place of or in addition to country reports.
2. ACEID publishes a large amount of literature on educational technology. It is recommended that a mailing list including educational technologists be prepared, and the relevant literature be sent to them, or to the institutions which they represent.

3. The holding of national seminars and workshops on educational technology has proven to be valuable. ACEID could encourage the organization of such workshops in the Member States annually or bi-annually by providing such professional and financial assistance as it can.
4. There are a number of interesting materials available in the member countries. ACEID should strive to find ways and means to multiply the knowledge on such materials, so that better low-cost educational materials become available. A mobile exhibition of such materials could be organized. In addition, films, slide-and-tape and video tapes could be produced and distributed to the member countries.
5. Inter-country visits to educational technology centres should be organized for qualified personnel, to strengthen and improve ideas and experiences in educational technology in the region, and to provide opportunities where exemplary materials can be put on demonstration.
6. It is recommended that a team of educational technologists from various member countries be constituted. The team would develop working guidelines to assess and evaluate the activities in education technology in the member countries, with particular emphasis on low-cost educational materials.

PART II

INSTRUCTION SHEETS FOR LOW-COST EDUCATIONAL MATERIALS

1. Stick/String Puppets
2. Simple Printing Machine
3. The Game of Balls Rolling Down the Slope
4. A or An Bingo
5. Preposition Clock
6. Adhesive Board
7. Cleanliness Game
8. Sequential Thinking Cards
9. Water Condenser
10. Instrument to Show Hot and Cool Air Currents
11. Recognition of the Shape of Objects

SHEET 1

1. **Title** : Stick/String Puppets

2. **Description**

These are puppets representing the main characters in "My English Book I" which is used in Nepal. They are Ram, Sita, Hari, Rita and Mr. Singh. The puppets are made of cardboard. When the string is pulled, the limbs move up and down.

3. **Objectives**

3.1 To identify the main characters in the book, "My English Book I", pages 11 and 12.

3.2 To identify the different parts of the body, "My English Book I", page 52.

3.3 To dramatize a story using the puppets as the main characters, "My English Book I", page 47.

3.4 To develop a speaking vocabulary by telling a sentence or two about the puppets, "My English Book I", page 42.

4. **Materials needed**

Cardboard	Colour	Scissors	Needle
String	Stick	Empty soft drink bottles	Paste

5. **How to make**

5.1 Draw on paper the main characters in the story. Draw them according to the desired sizes.

5.2 Cut and trace the trunk, arms and legs on a piece of cardboard. Allow an inch space at the top of the arms and legs and round off the edges. (See figure on page 60). Colour the clothes and body parts.

Figure of "Sita" puppet

5.3 **Arms.** Thread needle with string and make an end knot. Pull needle through holes No. 1 and No. 2. Secure the two parts tightly together and knot. Without cutting the string, pull it through hole No. 3 then across to No. 4. Place the arms straight downward and in this position, knot string at No. 4 and cut.

Follow the same procedure in attaching the other arm.

5.4 **Legs.** Make a knot at the end of the string. Pull needle through hole No. 5 and No. 6. Secure the two parts tightly together and knot. Without cutting it, pull the same string through No. 7, then across to No. 8. Place the legs straight downward and in this position, knot string at No. 8 and cut.

Follow the same procedure in attaching the other leg.

5.5 To make the limbs move, tie a piece of string to hole No. 9, then down to No. 10. Allow the end portion (about three inches or 8 cm) to hang loose, then cut. Paste the name of the doll and the words "Make me dance! " at end of string.

6. **How to use**

6.1 Use the puppets in introducing the main characters in the English textbook "My English Book I", pages 11 and 12. Allow children to manipulate the puppets to make the lesson more interesting.

6.2 Use the puppets in identifying the different parts of the body, "My English Book I", page 52.

6.3 Use the puppets to dramatize a story in the textbook "My English Book I", page 47. Children may hide behind a table or chair or curtain with only the stick puppets showing. Shy children are encouraged to participate in this manner.

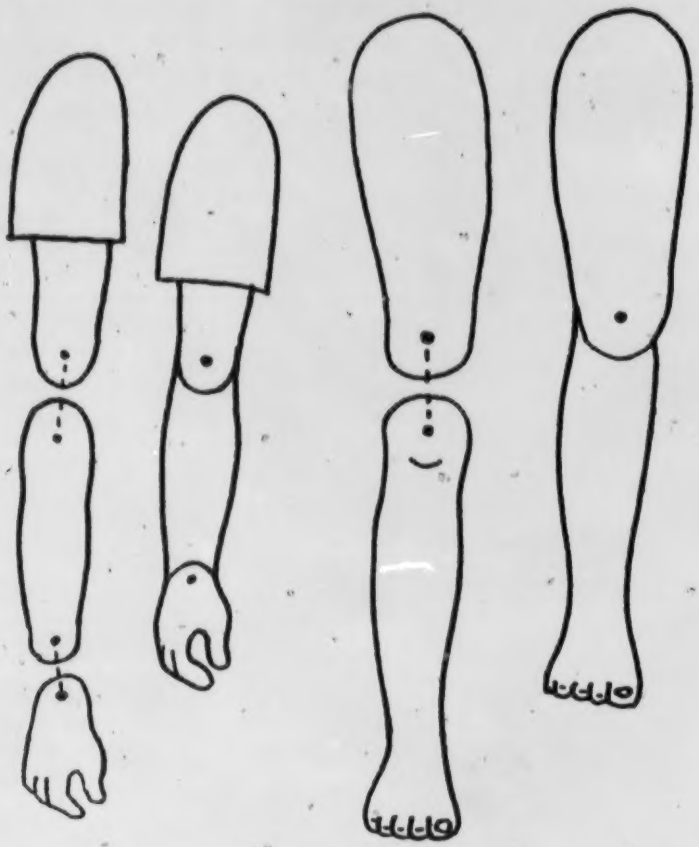
6.4 Practise speaking English by telling a few sentences about each puppet. Example:

My name is Mr. Singh.
I am a teacher.
Ram and Sita are my pupils.
Hari and Rita are my pupils too.

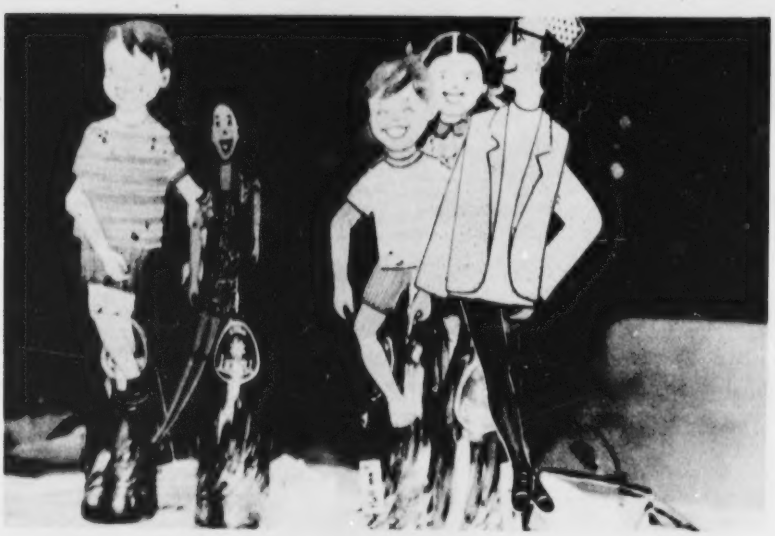
My name is Ram.
Sita is my sister.
I go to school.
Mr. Singh is my teacher.
Hari and Rita are my friends.

7. **Modification**

The limbs can be further divided into joints so that when pulled, they will have a variety of movements, as shown on page 62. The characters may be hung or placed on a stick and made to stand in empty soft drink bottles.



STICK



SHEET 2

1. **Title :** Simple Printing Machine

2. **Description**

A simple tool for printing, using the 'silk screen' principle. Prints are made by a typing stencil with the help of a jar and blotting paper. (Figure 1)

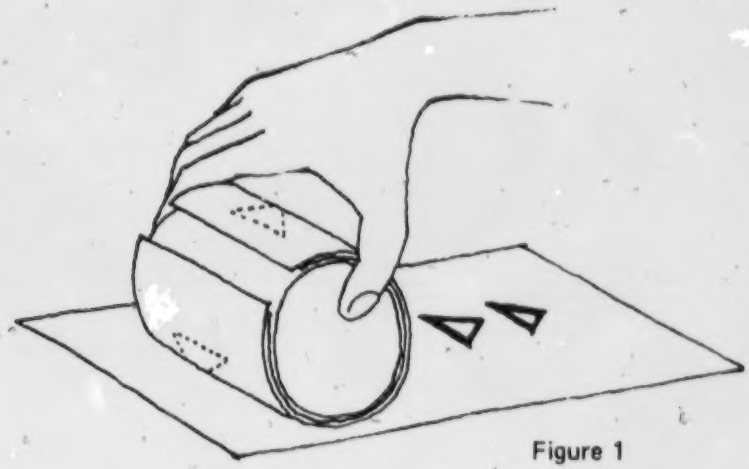


Figure 1

3. **Materials needed**

Blotting paper Typing stencil Bottle or jar Printing ink

4. **How to make**

a) Cut out a piece of stencil about two inches or 5 cm longer than the paper on which you wish to print.

b) Draw the desired figure on the stencil, using a stylus or fine ball-point pen. (Figure 2) Make sure that the etching of the stencil is firm by looking through it toward a light source.

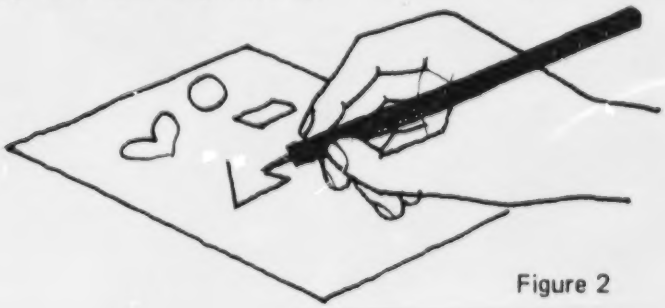


Figure 2

c) Squeeze some ink on the top of the stencil, covering all parts of the drawing. (Figure 3).

Figure 3

d) Place a piece of blotting paper the same size as the stencil on top of the ink (Figure 4).

Figure 4

e) Invert the blotting paper and stencil and wrap both around the jar or bottle, with the blotter against its surface. Tape the ends to the glass or plastic" (Figure 5).

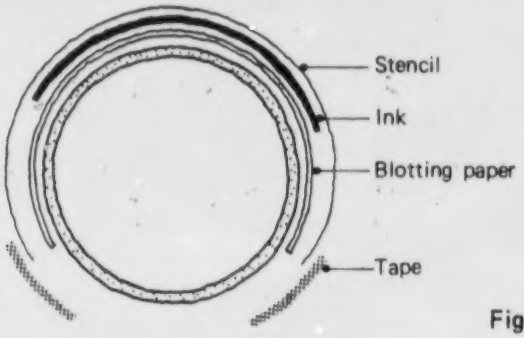


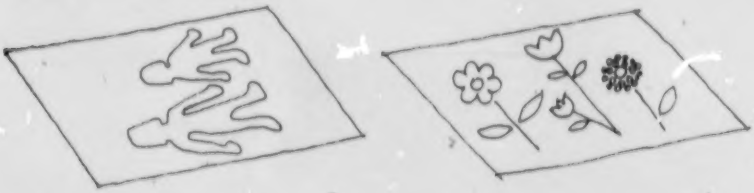
Figure 5

f) To print, roll the stencil on the sheet on which the figure is to be printed, as in Figure 1.

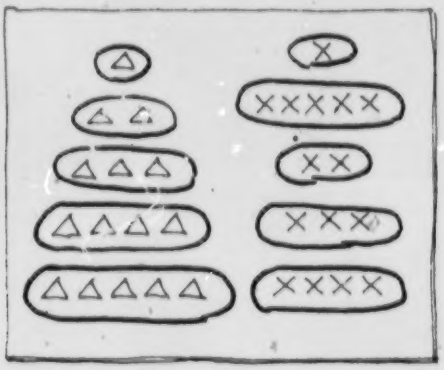
5. **How to use**

This simple device will print any line drawing or pattern.

a) Charts or drawings

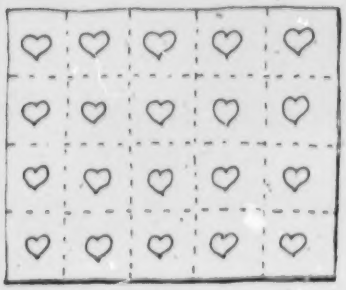


b) A chart for matching sets



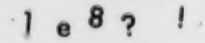
Drawing sheets

c) Pictures for language games



Drawing sheets

Cut out along the dotted line



Letters, Figures, Numbers

6. **Modifications**

Coloured pictures may be produced by using coloured printing inks.

Also remember that the figures can be printed onto a wide variety of materials, such as card, plastic, cloth and transparencies.

SHEET 3

1. **Title** : The game of Balls Rolling Down the Slope

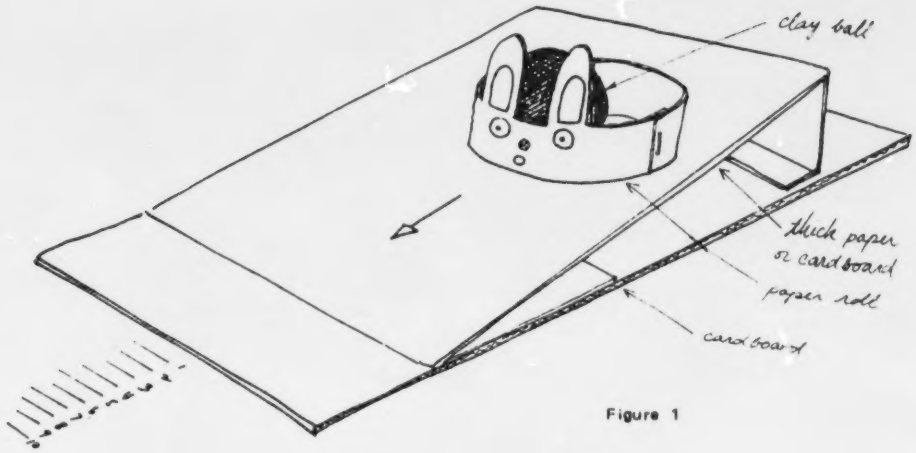


Figure 1

2. **Objectives**

2.1 To enhance children's problem-solving ability in areas of mathematics such as addition, subtraction and multiplication.

2.2 To help students to understand the general theory of the earth's gravitational pull on objects of different sizes and weights.

3. **Materials needed**

A pair of scissors; One sheet of cardboard and one sheet of thick paper;
Stapler and tape; Some clay balls; Some paper rolls with both ends open.

4. **How to make**

4.1 Make some clay balls of different sizes as in Figure 2.

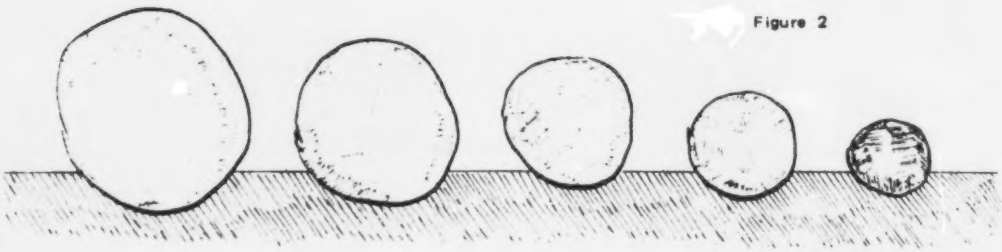
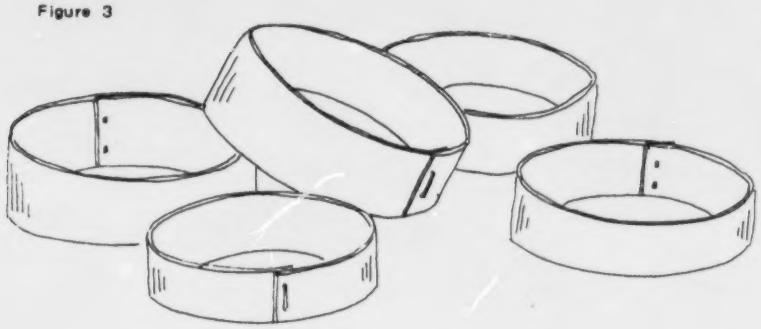


Figure 2

4.2 Make some paper rolls with both ends open as shown in Figure 3.

Figure 3



4.3 Place cardboard flat on the floor (Figure 1).

4.4 Place a strong, heavy paper or cardboard on top. Fix it in such a manner that it remains in a slanting position thereby making a good sloping platform (Figure 1).

4.5 Mark distances (inches or cm) on the floor where the sloping platform ends.

4.6 Place a clay ball inside a paper roll and let it roll down the slope. Observe or mark the distance where it stopped. Do this several times changing the sizes of the balls. Observe and record the differences in distance where each paper roll stops.

5. **How to use**

5.1 Children can create various kinds of drawings and designs around the paper roll. It also develops their skill in making round clay balls, paper rolls, and a sloping plane involving geometry.

5.2 It creates initiative and arouses interest among the children in solving arithmetic problems such as adding totals and multiplying efforts.

6. **Modifications**

6.1 The paper rolls can be replaced by bamboo rolls with both ends open. Likewise, in place of cardboard a wooden or plastic board is better.

6.2 Instead of marking by inches or centimetres the distance from the end of the platform, children may measure with a ruler the distances where the paper rolls stopped.

6.3 It is important that children playing this game make their own rules with the teacher guiding them.

SHEET 4

1. **Title :** ***A*** or ***An*** Bingo

2. **Description**

This game is a drill in strengthening concepts in the use of ***a*** and ***an.*** It follows the principles of bingo. Two teams take turns answering questions found inside the boxes which are arranged in rows of four.

3. **Objectives**

3.1 To develop mastery in the use of ***A*** and ***An.***

3.2 To develop the habit of following rules and instructions.

3.3 To show the importance of co-operation in team work.

4. **Materials needed**

Wide piece of cardboard or board
Sixteen empty cigarette boxes or other similar boxes
Cut-out drawings of boys and girls

5. **How to make**

5.1 Gather or make 16 empty boxes and paste them on the cardboard in rows of four.

5.2 Write 16 sentences which require either ***A*** or ***An.***

Examples:

I ate ___ apple this morning.

Rita received __ letter from her friend.

5.3 Place a question inside each box.

5.4 Cut out drawings of eight boys and eight girls.

6. **How to use**

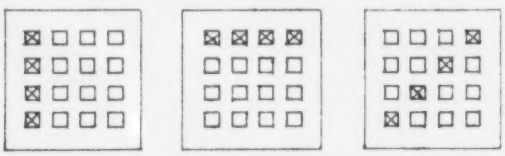
6.1 Divide the class into two teams – boys and girls.

6.2 Explain to them the rules of the game:

a) The teams take turn answering questions.
b) Each team should complete sentences in boxes attempting to complete a row either arranged vertically, horizontally, or diagonally.

6.3 Once the sentence is completed correctly, a picture of a boy (or girl as the case may be) is placed inside the box to mark it.

6.4 The first team to complete correctly the sentences in the boxes in a row wins the game. (Use X and O for boys' or girls' classes)

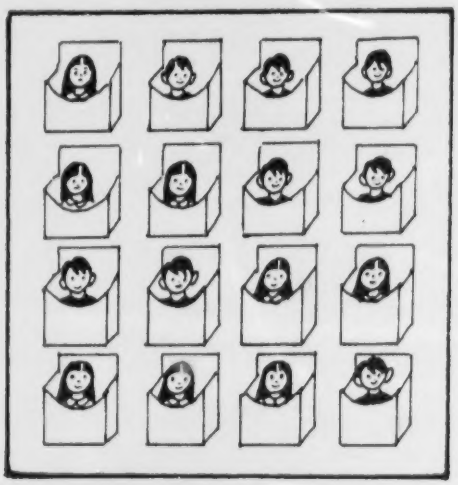


7. Modifications

7.1 Sentences or questions related to other subject areas such as reading, social studies, science and health and far more complex—may replace the ***A*** and ***An*** sentences.

7.2 The number of boxes may be changed to nine (rows of three) or 25 (rows of five). As smoking is dangerous and bad for the health, the teacher will be able to work in a lesson in health by stressing that other boxes are to be used.

7.3 The game may be raised to higher levels according to the complexity of the questions: completion sentences, true or false questions or even essay questions may be tried.



SHEET 5

1. **Title** : Preposition Clock

2. **Description**

This game is intended for use in lower primary schools, to help in developing and strengthening concepts of ***In, On, Over, Under*** and ***Above.*** It may be used as a drill or review for a specific lesson in an English book. It consists of a big circle resembling the face of a clock. Pictures demonstrating the concepts of ***In, On, Over, Above*** and ***Under*** are pasted along with the numbers 1 to 12. A small revolving circle with a long hand is tucked in the middle of the clock.

3. **Objective**

To help children in the lower grades learn how to use the prepositions ***In, On, Over, Under*** and ***Above*** correctly in sentences.

4. **Materials needed**

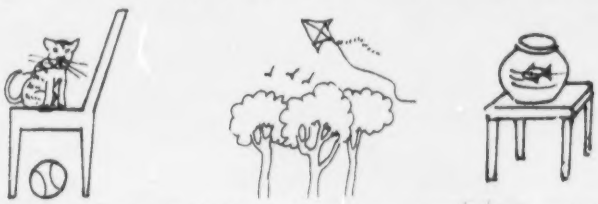
Big cardboard clock (16" or 40 cm in diameter)	Paste
Cardboard wheel (6" or 15 cm in diameter)	Scissors
Pictures	Nail

5. **How to make**

5.1 Draw a big clock face (16 inches or 40 cm) on a wide piece of cardboard.

5.2 Cut out 12 pictures showing different concepts of ***In, On, Above, Under*** and ***Over.***

Examples:



5.3 Arrange and paste the pictures along with the numbers 1 to 12 around the face of the clock.

5.4 Paint or paste a long hand on a smaller circle or wheel (6" in diameter).

5.5 Attach the smaller circle or wheel in the middle of the big clock. Ensure that it can be rotated clockwise and counter-clockwise.

6. **How to use**

6.1 Vigorously rotate the smaller circle or wheel clockwise.

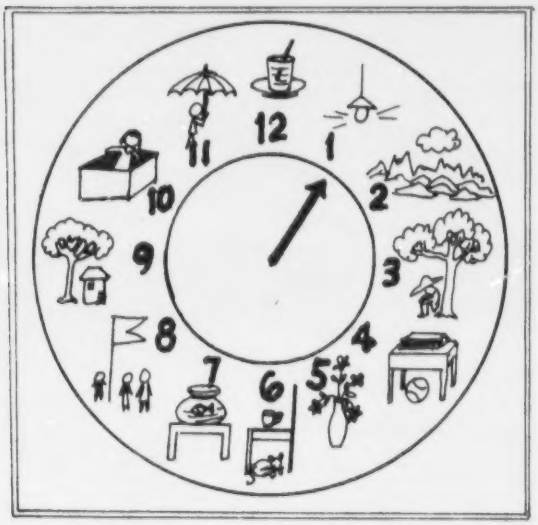
6.2 Notice at what time or number it stops. Find the picture that goes with the number.

6.3 Give a sentence or two about the picture using ***In, On, Above, Over*** or ***Under.***

7. **Modification**

7.1 This game can be used in a similar manner in other subject areas by changing the pictures to suit the purpose.

7.2 Numbers from 1 to 12 may be painted on empty boxes and pasted around the face of the clock. Pictures or questions may be placed inside the boxes to give an element of surprise.



SHEET 6

1. **Title:** Adhesive Board
2. **Description:** The flannel board can be made from any kind of wooden stand and used jute bags.
3. **Objectives:** To help in the demonstration of visual aids to children.
4. **Materials and tools needed**

Any kind of wooden draining board on stand made with slots	A saw
Used jute bag	A hammer
Some nails	A stapler
Plenty of fine sandpaper	A plane
	Pieces of wood to make a frame

5. **How to make**

5.1 Smooth the surface of the wooden stand with a plane (Figure 1).

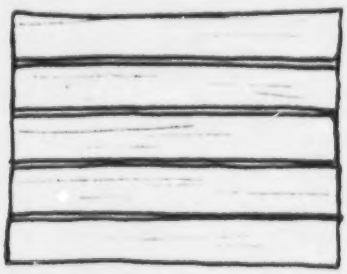


Figure 1 Fluted wooden draining board or stand

5.2 Take an old jute bag wide enough to cover the surface of the board. Lay it down over the board (Figures 2 and 3).

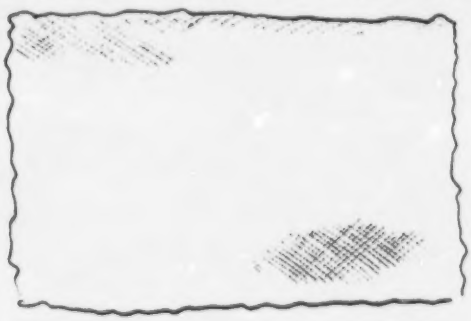


Fig. 2 Jute bag wide enough to cover surface of the board

Fig. 3 Lay jute bag over the board

5.3 Secure the jute bag over the board with nails.

5.4 Reinforce with staples every ten cms. (Figure 4)

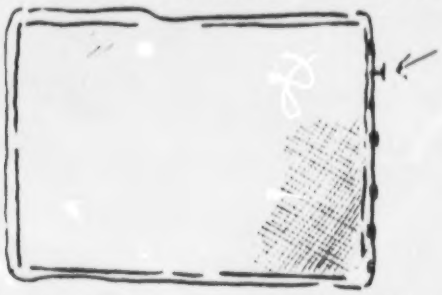


Fig.4 Hammer and staple the jute bag over the board

5.5 Finally, nail a wooden frame around the board. (Figures 5 and 6)

Fig.5 Side view of the flannel board

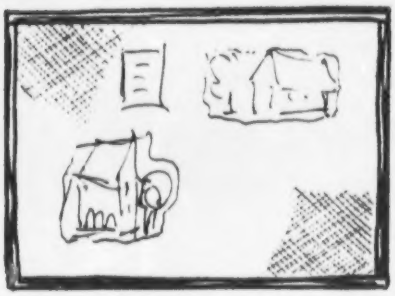


Fig.6 Wooden frame around the board

6. **How to use**

All kinds of pictures or other visual aids can be made to stick to the board for display purposes. Simply cut the pictures as required, and paste fine sandpaper to the backs of the cut-outs.

7. **Modifications**

Bamboo strips may take the place of wooden slats to make the surface of the board. Instead of a jute bag, other kinds of material such as used woollen blanket and flannel cloth may also serve the purpose.

SHEET 7

1. **Title:** Cleanliness Game

2. **Description**

This game is composed of a big sheet of drawing paper or a board divided into 50 compartments or rooms. Some of the compartments are illustrated with negative and positive health habits. Four pebbles of different colour and an improvised dice accompany the game board.

3. **Objectives**

3.1 To develop number concepts among lower-primary children.

3.2 To develop the habit of following rules and regulations.

3.3 To learn how to wait one's turn and play with others harmoniously.

3.4 To help develop desirable habits of personal hygiene.

4. **Materials needed**

A big sheet of drawing paper or board
Four pebbles of different colours
Colours for drawing or painting
Dice made of styrofoam, rubber, bamboo or coconut leaf

5. **How to make**

5.1 Divide the paper or board into 50 compartments or rooms.

5.2 Number consecutively from 1 to 50.

5.3 Illustrate compartments or rooms 6, 17, 24 and 28 with ***positive*** health habits; and rooms 26, 30, 42 and 44 with ***negative*** health habits.

5.4 Make a dice out of coconut leaf, styrofoam or any material available.

5.5 Take four small pebbles and paint them in different colours.

6. **How to use**

6.1 Two to four children may play this game. There are four pebbles of different colours.

6.2 Choose your colour and place it in Room 1. Throw the dice. Move your pebble according to the number that appears on your dice. Each one should wait for his turn. When you come to the picture room, do as follows:

Room 6 : You brush your teeth daily. Go up.

Room 17 : You take a bath daily. Go up.

Room 26 : Your clothes are dirty. Go down

Room 28 : You wash your hands properly before eating. Go up.

Room 30 : Your hair is not combed. Go down and comb it.

Room 34 : You have clean hands and finger nails. Go up.

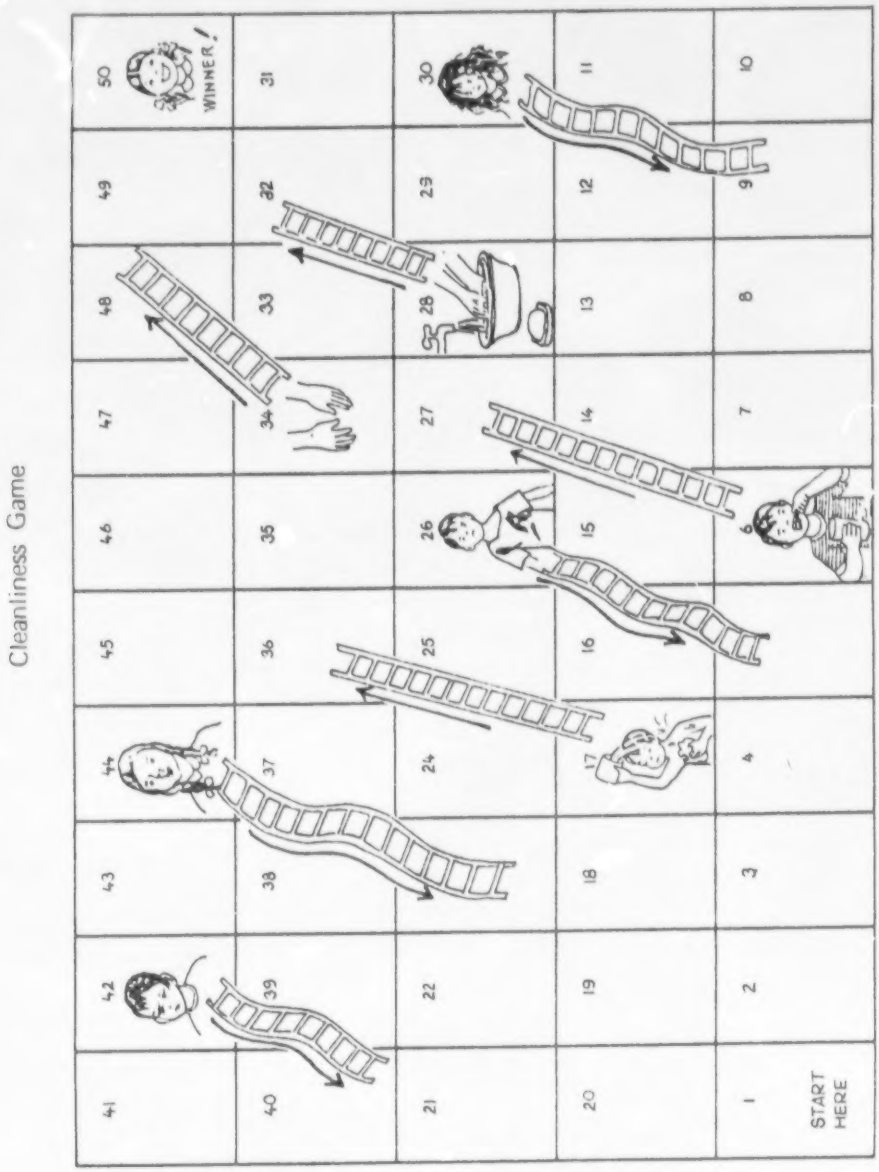
Room 42 : Your eyes and ears are dirty. Go down and clean them.

Room 44 : You have a running nose. Go down and clean it.

Room 50 : You are the winner! Congratulations!

7. **Modification**

Similar games in other subject areas may be played on the board by changing the illustration to fit the purpose. Examples are a balanced diet game, a road safety game, and so on.



SHEET 8

1. **Title :** Sequential Thinking Cards
2. **Description**

   This game consists of a set of cards of five or more pictures. The pictures depict events in sequence.
3. **Objectives**
   - 3.1 To help develop sequential thinking.
   - 3.2 To develop the ability to arrange events in a story in a sequential manner.
   - 3.3 To tell a story orally following sequential events.
4. **Materials needed**

   Cards (2 ½" x 4" or 7 x 11 cm) Crayons
5. **How to make**

   Draw pictures showing sequential events on five or more cards.
6. **How to use**
   - 6.1 Shuffle the cards and give them to a child.
   - 6.2 Ask him to arrange the set in proper sequence.
   - 6.3 Ask the child to tell the story in sequence as depicted in the cards.
7. **Modification**

   Instead of drawing the pictures, cut out magazines or newspaper pictures that depict a sequence of events and paste them on cards.

Sequential Thinking Cards

SHEET 9

1. **Title :** Water Condenser

2. **Description**

This is a simple water condenser which can be used as a substitute for Liebig's water condenser. Unlike the glass condenser, this one does not break when handled because it is made of plastic pipe and plastic tubings.

3. **Objective**

3.1 To show to students of lower secondary level a simple process of distillation.

4. **Materials needed**

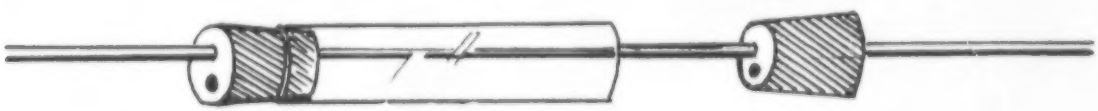
One transparent polythene pipe, 9" long (23 cm) and 1" (2.5 cm) in diameter.
One piece of transparent polythene tubing, 2 yards (or 2 metres) long.
Two short pieces of transparent polythene tubing.
Two rubber stoppers for the pipe with two holes each through which the pieces of tubing will fit.

5. **How to make**

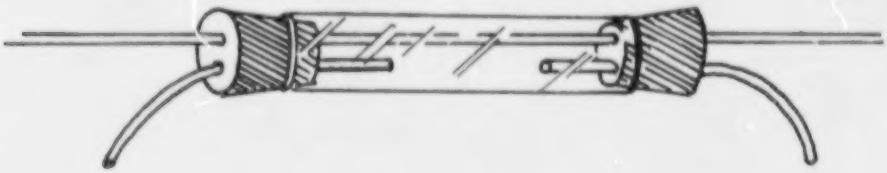
5.1 Insert the long polythene tubing into one of the holes in the stopper.

5.2 Fix the stopper into one end of the pipe.

5.3 Insert the end of the tubing that comes out of the pipe into one of the holes of the other stopper and fix this stopper into the pipe.



5.4 Insert the two short pieces of polythene tubing into the remaining holes of each stopper.



6. **How to use**

To use this condenser, connect the long polythene tubing with the distillation flask tubing. Let the cold water go into one end of the short tubing and out of the other. The circulating cold water will cool the liquid being distilled.

7. **Modification**

If polythene (or glass) pipe is not available, a bamboo tube will make a good substitute.

SHEET 10

1. **Title:** Instrument to Show Hot and Cool Air Currents

2. **Description**

When air is heated it becomes lighter and is replaced by heavier air, i.e. cold air. The replacement of hot air by cold air generates an air current. This can be shown by the rotary movement of the instrument.

3. **Materials needed**

Sheet of paper approx. 9" x 12" (23 x 31 cm)
Electric bulb
Light socket and extension cord
Stiff wire
Scissors
Empty can approx. 3½" (9 cm) in diameter
End piece of a distilled water ampoule

4. **How to make**

4.1 Cut one side of the sheet of paper as shown in Figure 1.

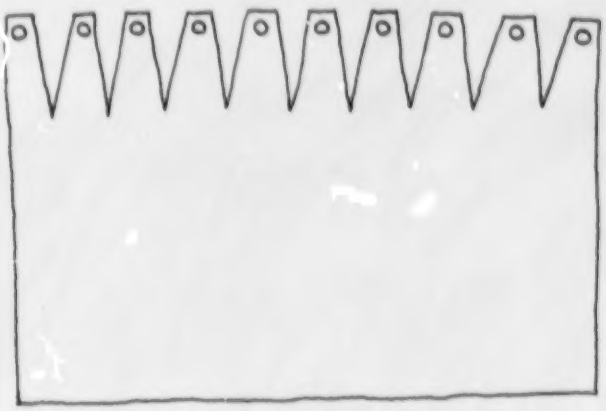


Figure 1

4.2 Close all the teeth together over the ampoule tip, thus forming a canopy, as shown in Figure 2. Glue the sides together.

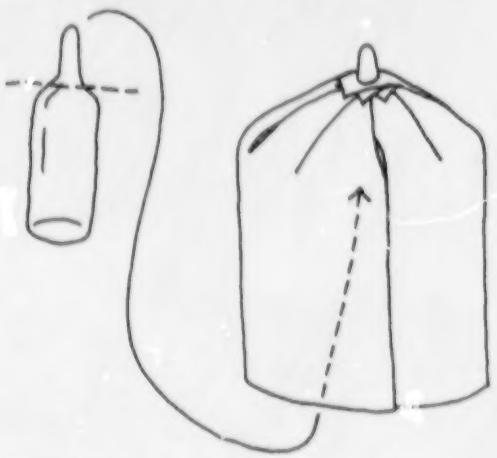


Figure 2

4.3 Tie the metal wire around the bulb and extend it to the top, into the ampoule. Place the bulb inside the empty can. (see Figure 3)

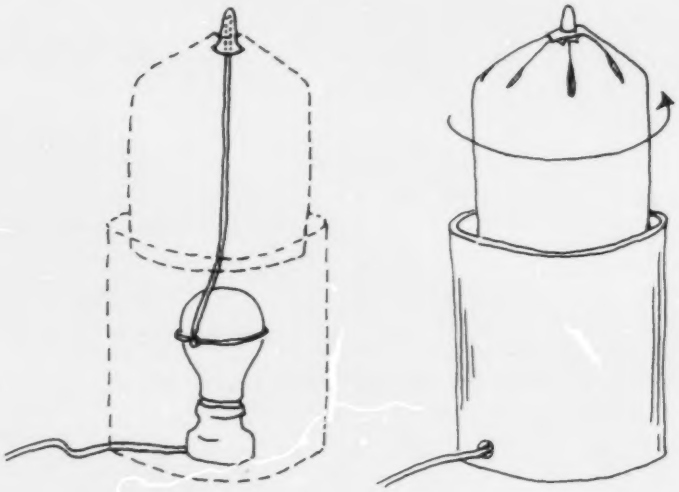


Figure 3

4.4 Balance the canopy on the wire, either inside or outside the can.

5. **How to use**

Turn on the current to light the bulb. The paper canopy will start revolving around the pivot, showing the movement of hot and cold air.

SHEET 11

1. **Title :** Recognition of the Shape of Objects
2. **Description**

   This game can be played with all kinds of shapes – those of maps, animals, people or any other object.

3. **Objectives**

   3.1 To make children sensitive to the shapes of objects.

   3.2 To help arouse children's cognitive and perceptive powers.

4. **Materials needed**

   A pen or pencil
   Pictures of people or animals, maps, or other images
   One thick sheet of paper with a small hole in the middle
   One extra thick sheet to be used as a base for the object

5. **How to make**

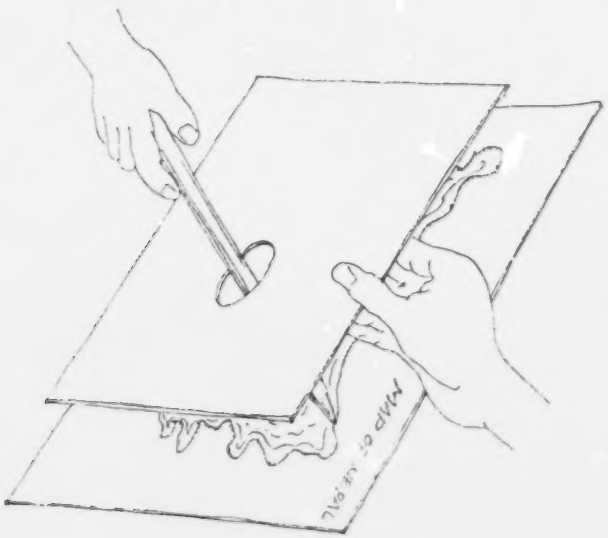
   5.1 Paste the picture of the object on a thick sheet of paper.

   5.2 Place the thick sheet, with a hole in the centre, over the object.

   5.3 Insert a pen or pencil in the hole of the cover sheet

   5.4 Hold it some distance from the object or picture to be traced so that only part of the image can be seen through the hole (see Figure 1 below).

   5.5 Start tracing the picture from beginning to end.
   Note the time taken to finish the game.



6. **How to use**

This game is not an end in itself. It is simply another way to help the pupils widen their knowledge of subjects like geography and art, and sharpen their ability to recognize shapes, and their memories.

7. **Modification**

The thick sheet of paper which is used for tracing the object should naturally be bigger in size than the size of the object. Since this is a simple game, the teacher should minimize his role and let the child play the central role.

PART III

ANNEXES

Annex I

AGENDA

1. Inauguration of the workshop
2. Election of officers of the workshop and consideration of the agenda and the provisional schedule of work
3. Experiences of the participants in the development and use of low-cost educational materials, games and toys in their countries
4. Consideration of guidelines in the design, development and utilization of low-cost, simple materials, games and toys
5. Development of low-cost, simple materials and preparation of instruction sheets
6. Preparation of national follow-up plans
7. Consideration and adoption of the workshop report
8. Closing of the workshop

Annex II

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Annex III

OFFICERS OF THE WORKSHOP

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Alternate Chairman	Miss S.P. Navaroo (Philippines)
Vice-Chairman	Dr. (Mrs.) R. Muralidharan (India) Mr. Adam bin Taib (Malaysia)
Rapporteurs	Mr. Dilip Bakshi (India) Mr. K. Loganathan (Malaysia) Mr. Bimal Lal Shrestha (Nepal)

Members of the Steering Committee

Mr. Ram Krishna Upadhyay (Nepal)	Mr. K. Loganathan (Malaysia)
Miss S.P. Navarro (Philippines)	Mr. Bimal Lal Shrestha (Nepal)
Dr. (Mrs.) R. Muralidharan (India)	Dr. Prem K. Kasaju (Nepal)
Mr. Adam bin Taib (Malaysia)	Dr. Thamrong Buasri (Unesco)
Dr. Dilip Bakshi (India)	Mr. Ryo Watanabe (Unesco)

Members of the Organizing Committee

Dr. Prem Kumar Kasaju (Workshop Director)	Centre for Educational Research, Innovation and Development (CERID)
Mr. Ryo Watanabe	ACEID, Unesco Regional Office for Education in Asia and Oceania, Bangkok
Mrs. Sabitri Singh	Centre for Educational Research, Innovation and Development (CERID)
Mr. Bimal Lal Shrestha	Curriculum Textbook and Supervision Development Centre, Ministry of Education
Miss Sunita Malakar	Centre for Educational Research, Innovation and Development (CERID)
Mr. Raj Ranajit (Senior Secretarial Assistant)	do
Mr. Narayan Khadka (Secretarial Assistant)	do
Mr. Gaja Sundar Pradhan (Workshop Secretary)	do

Group Members for Agenda Items 3 and 4

Synthesis of the countries' experiences and development of guidelines

Group A

Dr. (Mrs.) R. Muralidharan (India) – Chairman
Mr. K. Loganathan (Malaysia) – Rapporteur
Mr. A.M. Aumaj (Afghanistan)
Prof. Kunihiro Suetake (Japan)
Mr. G.S. Pradhan (Nepal)
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Group B

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Mr. B.L. Shrestha (Nepal) – Rapporteur
Mr. A.G. Nayeb (Afghanistan)
Mr. N. Ohsumi (Japan)
Mr. J.R. Ranjitkar (Nepal)
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Miss S. Malakar (Nepal)
Mr. R.K. Upadhyay (Nepal)
Mr. S.A. Khan (Pakistan)
Miss A. Palu-ay (Philippines)

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	(3) Mr. Bimal Lal Shrestha	(4) Mr. Home Nath Sharma*
Group B :	(1) Mr. Adam bin Taib	(2) Mr. Dilip Bakshi
	(3) Mr. Ram Krishna Upadhyay	(4) Mr. Kumar Pradhan*
Group C :	(1) Miss S.P. Navarro	(2) Mr. Norikazu Ohsumi
	(3) Miss Sunita Malakar	(4) Mr. Shree Ram Lamichhane*
Group D :	(1) Mr. K. Loganathan	(2) Prof. Kunihiro Suetake
	(3) Mr. Java Ram Ranjitkar	(4) Mr. Laxmi Kant Panthi*
Group E :	(1) Mr. Ajab Gul Nayeb	(2) Mr. S. A. Khan
	(3) Mr. Dev Bhadur Dangol	(4) Mr. K.B. Sob*
Group F :	(1) Mr. Aziz Mohammad Aumaj	(2) Mr. Mohammad Akmal
	(3) Mr. Gaja Sundar Pradhan	(4) Mr. Bal Bahadur Kunwar*

* Staff of CERID participated in the group work.

7 Modification

The limbs can be further divided into joints so that when pulled, they will have a variety of movements, (~~At least see cut below~~) as shown below. The characters may be hung or placed on a stick and made to stand ~~in the~~ in empty soft drink bottles.